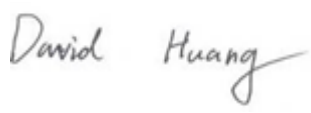


# RF TEST REPORT



Report No.: 17071118-FCC-R

Supersede Report No.: N/A

|                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Applicant                                                                                                                            | Shenzhen Youyuanhongye Electronic Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
| Product Name                                                                                                                         | Wireless Mouse                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                       |
| Main Model                                                                                                                           | SPK7211                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |
| Serial Model                                                                                                                         | SPK7211W, SPK7211B, SPK7211P, SPK7322, SPK7211PS, SPK7221B, SPK7221W, SPK7211BSC, SPK7402W, SPK7402B, SPK7402WS, SPK7402BS, SPK7211WSC, SPT6501W, SPT6501B, SPT6501BS, SPT6602, W1020, W1080, W1040, W1050, MW291, MW286, MW287, MW692, W1040X, GMW201, GW103, GW102-Pro, GW101-Pro, GW104, CW1260, CW6262, CW1261, MW2027, MW2082, MW2091, MW2022, MW2093, M2082, M2032, M2088, MW2032, M2108, M2022, M2087, M2030, MW2088, MW2092, MW2030, M2106. |                                                                                       |
| Test Standard                                                                                                                        | FCC Part 15.249: 2016; ANSI C63.10: 2013                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
| Test Date                                                                                                                            | October 21 to 30, 2017                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
| Issue Date                                                                                                                           | October 31, 2017                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                       |
| Test Result                                                                                                                          | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
| Equipment complied with the specification                                                                                            | <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                       |
| Equipment did not comply with the specification                                                                                      | <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                  |  |
| Loren Luo<br>Test Engineer                                                                                                           | David Huang<br>Checked By                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                       |
| This test report may be reproduced in full only<br>Test result presented in this test report is applicable to the tested sample only |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |

**Issued by:**

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

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## Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

| Country/Region | Scope                              |
|----------------|------------------------------------|
| USA            | EMC, RF/Wireless, SAR, Telecom     |
| Canada         | EMC, RF/Wireless, SAR, Telecom     |
| Taiwan         | EMC, RF, Telecom, SAR, Safety      |
| Hong Kong      | RF/Wireless, SAR, Telecom          |
| Australia      | EMC, RF, Telecom, SAR, Safety      |
| Korea          | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan          | EMI, RF/Wireless, SAR, Telecom     |
| Singapore      | EMC, RF, SAR, Telecom              |
| Europe         | EMC, RF, SAR, Telecom, Safety      |

|                 |                |
|-----------------|----------------|
| Test Report No. | 17071118-FCC-R |
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## 1. Report Revision History

| Report No.     | Report Version | Description | Issue Date       |
|----------------|----------------|-------------|------------------|
| 17071118-FCC-R | NONE           | Original    | October 31, 2017 |
|                |                |             |                  |
|                |                |             |                  |
|                |                |             |                  |
|                |                |             |                  |
|                |                |             |                  |

## 2. Customer information

|                  |                                                                                                               |
|------------------|---------------------------------------------------------------------------------------------------------------|
| Applicant Name   | Shenzhen Youyuanhongye Electronic Co., Ltd.                                                                   |
| Applicant Add    | Building 18, 4th Area, Huaidecuigang Industrial Park, Fuyong Street, Baoan District, Shenzhen City, P.R.China |
| Manufacturer     | Shenzhen Youyuanhongye Electronic Co., Ltd.                                                                   |
| Manufacturer Add | Building 18, 4th Area, Huaidecuigang Industrial Park, Fuyong Street, Baoan District, Shenzhen City, P.R.China |

### 3. Test site information

#### Test Lab A:

|                      |                                                                                                                                              |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES                                                                                                         |
| Lab Address          | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park<br>South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China<br>518108 |
| FCC Test Site No.    | 535293                                                                                                                                       |
| IC Test Site No.     | 4842E-1                                                                                                                                      |
| Test Software        | Radiated Emission Program-To Shenzhen v2.0                                                                                                   |

#### Test Lab B:

|                      |                                                                                       |
|----------------------|---------------------------------------------------------------------------------------|
| Lab performing tests | SIEMIC (Nanjing-China) Laboratories                                                   |
| Lab Address          | 2-1 Longcang Avenue Yuhua Economic and<br>Technology Development Park, Nanjing, China |
| FCC Test Site No.    | 694825                                                                                |
| IC Test Site No.     | 4842B-1                                                                               |
| Test Software        | EZ_EMG(ver.lcp-03A1)                                                                  |

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

#### 4. Equipment under Test (EUT) Information

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description of EUT:           | Wireless Mouse                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Main Model:                   | SPK7211                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Serial Model:                 | SPK7211W, SPK7211B, SPK7211P, SPK7322, SPK7211PS, SPK7221B, SPK7221W, SPK7211BSC, SPK7402W, SPK7402B, SPK7402WS, SPK7402BS, SPK7211WSC, SPT6501W, SPT6501B, SPT6501BS, SPT6602, W1020, W1080, W1040, W1050, MW291, MW286, MW287, MW692, W1040X, GMW201, GW103, GW102-Pro, GW101-Pro, GW104, CW1260, CW6262, CW1261, MW2027, MW2082, MW2091, MW2022, MW2093, M2082, M2032, M2088, MW2032, M2108, M2022, M2087, M2030, MW2088, MW2092, MW2030, M2106. |
| Date EUT received:            | October 20, 2017                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Test Date(s):                 | October 21 to 30, 2017                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Antenna Gain:                 | 0 dBi                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Antenna Type:                 | PCB antenna                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Power:                        | 75.58dB                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Type of Modulation:           | GFSK                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| RF Operating Frequency (ies): | 2402-2480MHz                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Number of Channels:           | 16CH                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Input Power:                  | DC 1.5V                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Trade Name :                  | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| FCC ID:                       | 2AN4H-SPK7211                                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

| FCC Rules                                   | Description of Test                                   | Result     |
|---------------------------------------------|-------------------------------------------------------|------------|
| §15.203                                     | Antenna Requirement                                   | Compliance |
| §15.207(a)                                  | AC Line Conducted Emissions                           | Compliance |
| §15.205, §15.209,<br>§15.249(a), §15.249(d) | Radiated Fundamental<br>/ Radiated Spurious Emissions | Compliance |
| §15.249(a)                                  | Field Strength Measurement                            | Compliance |
| §15.249©                                    | 20 dB Bandwidth                                       | Compliance |
| §15.249(d)                                  | Band Edge                                             | Compliance |

### Measurement Uncertainty

| Emissions                                 |                                                                                                                                                 |               |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Test Item                                 | Description                                                                                                                                     | Uncertainty   |
| Band Edge and Radiated Spurious Emissions | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | +5.6dB/-4.5dB |
| -                                         | -                                                                                                                                               | -             |

## 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

### 6.1 Antenna Requirement

#### Standard Requirement:

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.
- c. Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

#### Antenna Connector Construction

A permanently attached PCB antenna, the gain is 0 dBi.

**Test Result: Pass**

## 6.2 AC Line Conducted Emissions

|                      |                  |
|----------------------|------------------|
| Temperature          | 26 °C            |
| Relative Humidity    | 57%              |
| Atmospheric Pressure | 1025mbar         |
| Test date :          | October 25, 2017 |
| Tested By :          | Loren Luo        |

| Spec       | Item | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Applicable                                     |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
|------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------|--------------|--|----|---------|------------|---------|---------|---------|----|----|--------|----|----|
| §15.207    | a)   | For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges. | <div><input checked="" type="checkbox"/></div> |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      | <table><tr><th rowspan="2">Frequency ranges<br/>(MHz)</th><th colspan="2">Limit (dBµV)</th></tr><tr><th>QP</th><th>Average</th></tr><tr><td>0.15 ~ 0.5</td><td>66 – 56</td><td>56 – 46</td></tr><tr><td>0.5 ~ 5</td><td>56</td><td>46</td></tr><tr><td>5 ~ 30</td><td>60</td><td>50</td></tr></table>                                                                                                                                                                     |                                                | Frequency ranges<br>(MHz) | Limit (dBµV) |  | QP | Average | 0.15 ~ 0.5 | 66 – 56 | 56 – 46 | 0.5 ~ 5 | 56 | 46 | 5 ~ 30 | 60 | 50 |
|            |      | Frequency ranges<br>(MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                |                           | Limit (dBµV) |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                | QP                        | Average      |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      | 0.15 ~ 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                | 66 – 56                   | 56 – 46      |  |    |         |            |         |         |         |    |    |        |    |    |
| 0.5 ~ 5    | 56   | 46                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
| 5 ~ 30     | 60   | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
|            |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
| Test Setup |      | <div><div><div>Vertical Ground Reference Plane</div><div>40 cm</div><div>EUT</div><div>LISN</div><div>80 cm</div><div>Test Receiver</div><div>Horizontal Ground Reference Plane</div></div><div>Note: 1.Support units were connected to second LISN.<br/>2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.</div></div>                                                                                     |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |
| Procedure  |      | <div><div>1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.</div><div>2. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains.</div><div>3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.</div></div>                                                                 |                                                |                           |              |  |    |         |            |         |         |         |    |    |        |    |    |

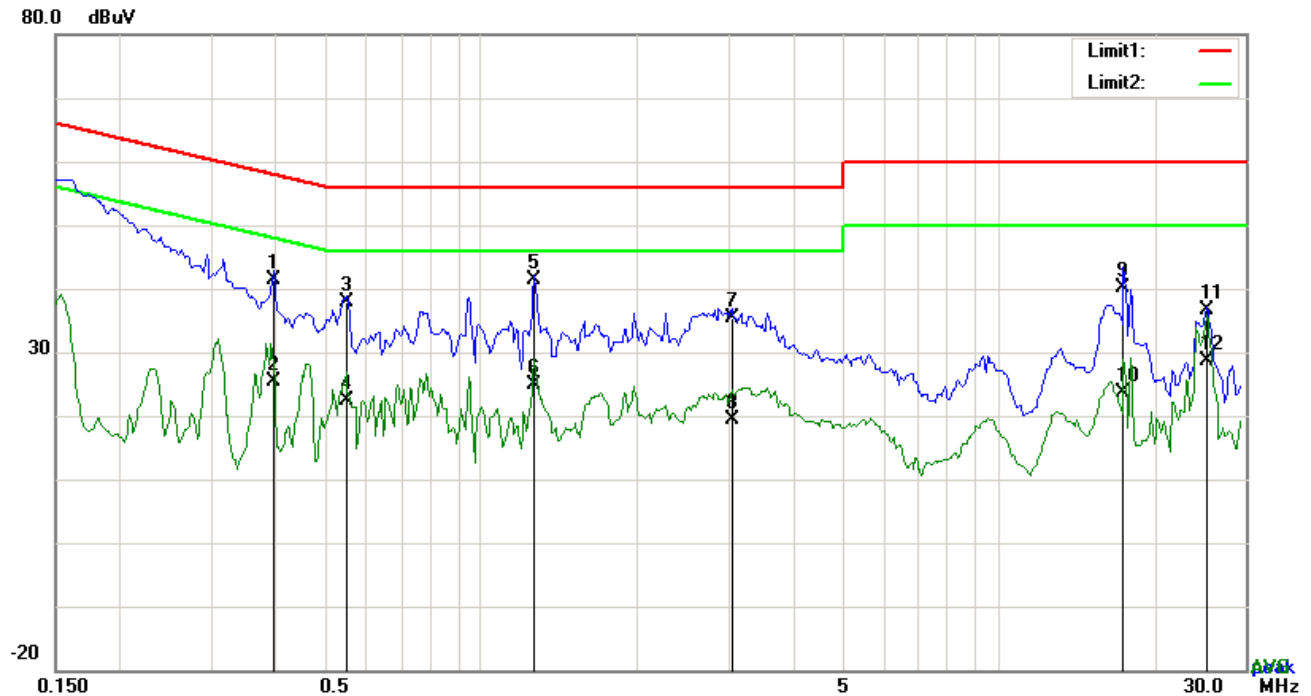
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|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <p>4. All other supporting equipment were powered separately from another main supply.</p> <p>5. The EUT was switched on and allowed to warm up to its normal operating condition.</p> <p>6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.</p> <p>7. High peaks, relative to the limit line, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz.</p> <p>8. Step 7 was then repeated for the LIVE line (for AC mains) or DC line (for DC power).</p> |
| Remark |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

**Test Mode:** 2.4G Mode

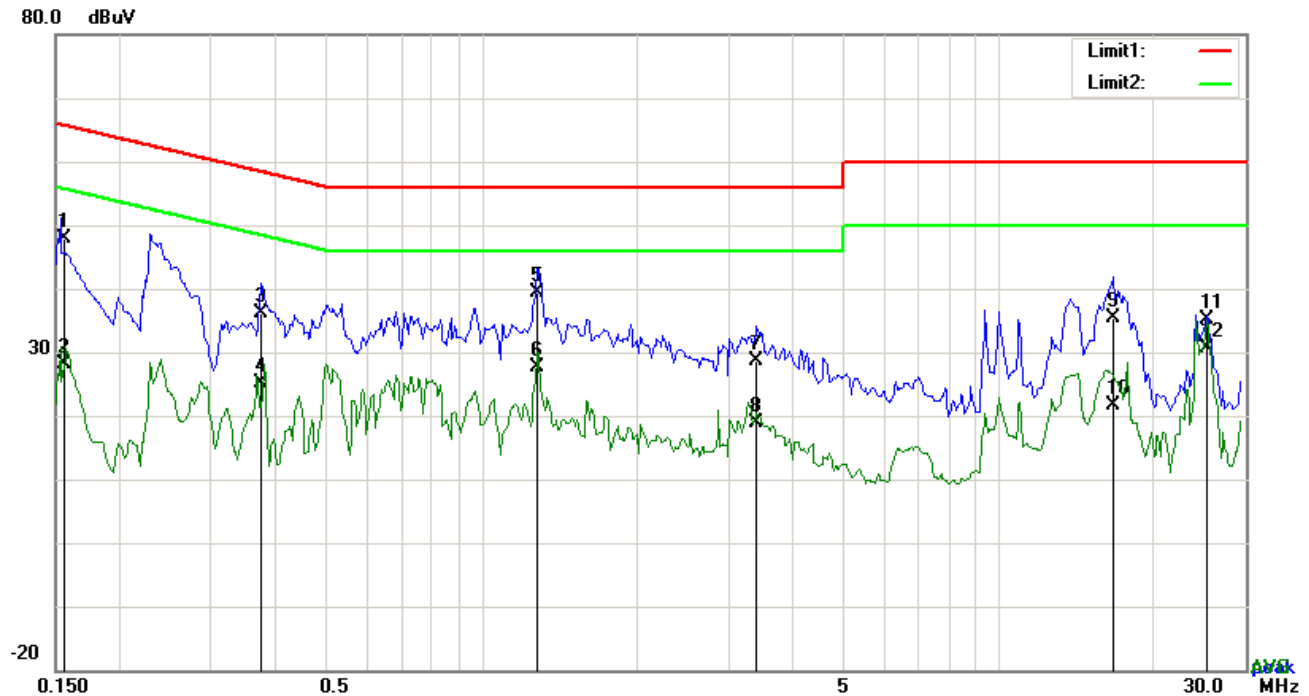


**Test Data**

**Phase Line Plot at 120Vac, 60Hz**

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | L1  | 0.3957    | 31.45   | QP       | 10.03     | 41.48  | 57.94  | -16.46 |
| 2   | L1  | 0.3957    | 15.45   | AVG      | 10.03     | 25.48  | 47.94  | -22.46 |
| 3   | L1  | 0.5517    | 27.90   | QP       | 10.03     | 37.93  | 56.00  | -18.07 |
| 4   | L1  | 0.5517    | 12.33   | AVG      | 10.03     | 22.36  | 46.00  | -23.64 |
| 5   | L1  | 1.2654    | 31.43   | QP       | 10.03     | 41.46  | 56.00  | -14.54 |
| 6   | L1  | 1.2654    | 14.85   | AVG      | 10.03     | 24.88  | 46.00  | -21.12 |
| 7   | L1  | 3.0576    | 25.24   | QP       | 10.06     | 35.30  | 56.00  | -20.70 |
| 8   | L1  | 3.0576    | 9.25    | AVG      | 10.06     | 19.31  | 46.00  | -26.69 |
| 9   | L1  | 17.4495   | 29.79   | QP       | 10.26     | 40.05  | 60.00  | -19.95 |
| 10  | L1  | 17.4495   | 13.29   | AVG      | 10.26     | 23.55  | 50.00  | -26.45 |
| 11  | L1  | 25.2300   | 26.19   | QP       | 10.40     | 36.59  | 60.00  | -23.41 |
| 12  | L1  | 25.2300   | 18.33   | AVG      | 10.40     | 28.73  | 50.00  | -21.27 |

**Test Mode:** 2.4G Mode

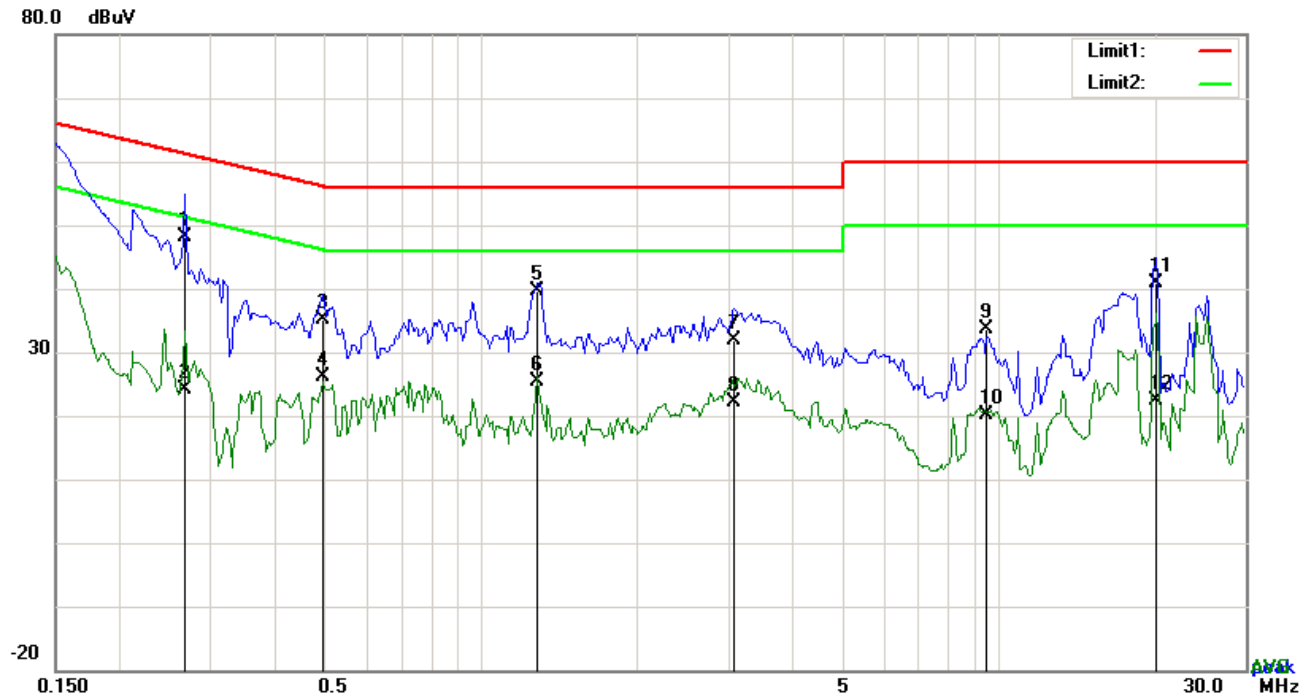


**Test Data**

**Phase Neutral Plot at 120Vac, 60Hz**

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | N   | 0.1557    | 37.89   | QP       | 10.03     | 47.92  | 65.69  | -17.77 |
| 2   | N   | 0.1557    | 18.21   | AVG      | 10.03     | 28.24  | 55.69  | -27.45 |
| 3   | N   | 0.3762    | 26.09   | QP       | 10.03     | 36.12  | 58.36  | -22.24 |
| 4   | N   | 0.3762    | 15.20   | AVG      | 10.03     | 25.23  | 48.36  | -23.13 |
| 5   | N   | 1.2888    | 29.29   | QP       | 10.03     | 39.32  | 56.00  | -16.68 |
| 6   | N   | 1.2888    | 17.67   | AVG      | 10.03     | 27.70  | 46.00  | -18.30 |
| 7   | N   | 3.4056    | 18.54   | QP       | 10.06     | 28.60  | 56.00  | -27.40 |
| 8   | N   | 3.4056    | 8.84    | AVG      | 10.06     | 18.90  | 46.00  | -27.10 |
| 9   | N   | 16.6539   | 25.14   | QP       | 10.25     | 35.39  | 60.00  | -24.61 |
| 10  | N   | 16.6539   | 11.35   | AVG      | 10.25     | 21.60  | 50.00  | -28.40 |
| 11  | N   | 25.2300   | 24.62   | QP       | 10.40     | 35.02  | 60.00  | -24.98 |
| 12  | N   | 25.2300   | 20.15   | AVG      | 10.40     | 30.55  | 50.00  | -19.45 |

**Test Mode:** 2.4G Mode

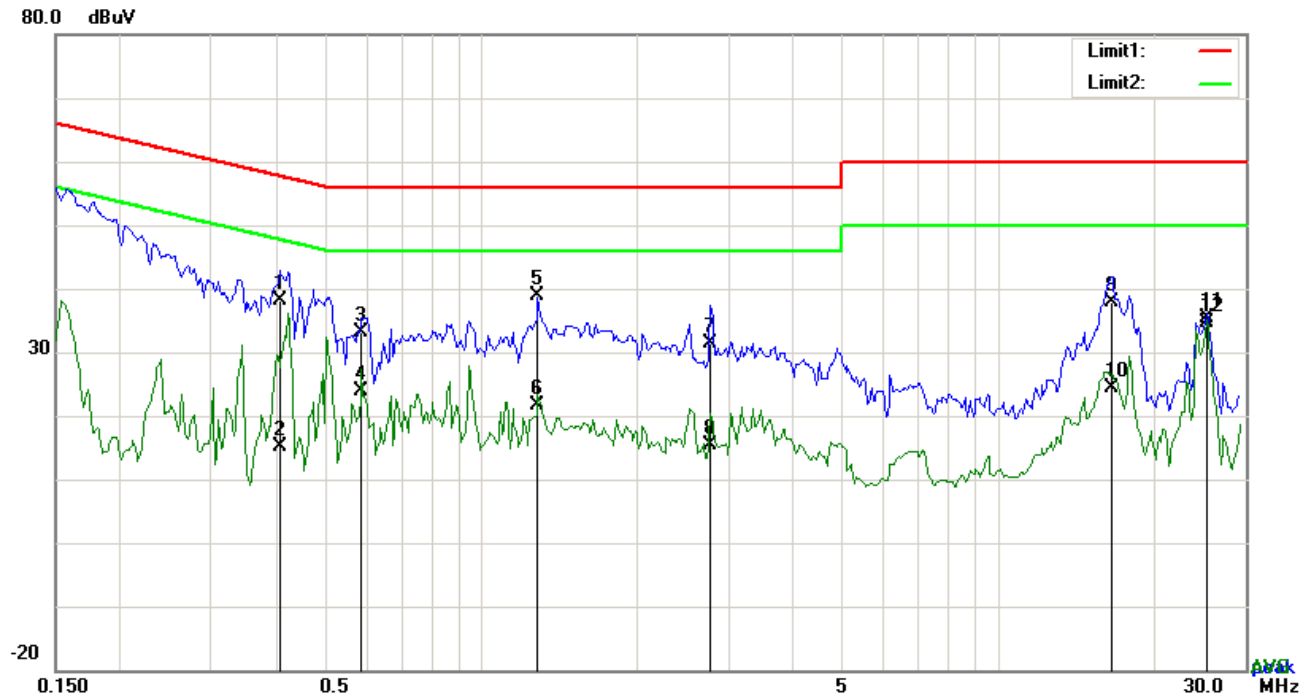


**Test Data**

**Phase Line Plot at 240Vac, 60Hz**

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | L1  | 0.2670    | 38.00   | QP       | 10.03     | 48.03  | 61.21  | -13.18 |
| 2   | L1  | 0.2670    | 14.03   | AVG      | 10.03     | 24.06  | 51.21  | -27.15 |
| 3   | L1  | 0.4932    | 25.11   | QP       | 10.03     | 35.14  | 56.11  | -20.97 |
| 4   | L1  | 0.4932    | 16.18   | AVG      | 10.03     | 26.21  | 46.11  | -19.90 |
| 5   | L1  | 1.2849    | 29.48   | QP       | 10.03     | 39.51  | 56.00  | -16.49 |
| 6   | L1  | 1.2849    | 15.23   | AVG      | 10.03     | 25.26  | 46.00  | -20.74 |
| 7   | L1  | 3.0741    | 21.85   | QP       | 10.06     | 31.91  | 56.00  | -24.09 |
| 8   | L1  | 3.0741    | 12.19   | AVG      | 10.06     | 22.25  | 46.00  | -23.75 |
| 9   | L1  | 9.4974    | 23.39   | QP       | 10.14     | 33.53  | 60.00  | -26.47 |
| 10  | L1  | 9.4974    | 9.87    | AVG      | 10.14     | 20.01  | 50.00  | -29.99 |
| 11  | L1  | 20.2224   | 30.68   | QP       | 10.30     | 40.98  | 60.00  | -19.02 |
| 12  | L1  | 20.2224   | 11.99   | AVG      | 10.30     | 22.29  | 50.00  | -27.71 |

**Test Mode:** 2.4G Mode



### Test Data

### Phase Neutral Plot at 240Vac, 60Hz

| No. | P/L | Frequency | Reading | Detector | Corrected | Result | Limit  | Margin |
|-----|-----|-----------|---------|----------|-----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV)  |          | (dB)      | (dBuV) | (dBuV) | (dB)   |
| 1   | N   | 0.4074    | 28.11   | QP       | 10.02     | 38.13  | 57.70  | -19.57 |
| 2   | N   | 0.4074    | 5.06    | AVG      | 10.02     | 15.08  | 47.70  | -32.62 |
| 3   | N   | 0.5868    | 23.06   | QP       | 10.02     | 33.08  | 56.00  | -22.92 |
| 4   | N   | 0.5868    | 13.97   | AVG      | 10.02     | 23.99  | 46.00  | -22.01 |
| 5   | N   | 1.2849    | 28.91   | QP       | 10.03     | 38.94  | 56.00  | -17.06 |
| 6   | N   | 1.2849    | 11.55   | AVG      | 10.03     | 21.58  | 46.00  | -24.42 |
| 7   | N   | 2.7747    | 21.31   | QP       | 10.05     | 31.36  | 56.00  | -24.64 |
| 8   | N   | 2.7747    | 5.37    | AVG      | 10.05     | 15.42  | 46.00  | -30.58 |
| 9   | N   | 16.5720   | 27.74   | QP       | 10.22     | 37.96  | 60.00  | -22.04 |
| 10  | N   | 16.5720   | 14.05   | AVG      | 10.22     | 24.27  | 50.00  | -25.73 |
| 11  | N   | 25.2300   | 24.92   | QP       | 10.34     | 35.26  | 60.00  | -24.74 |
| 12  | N   | 25.2300   | 24.21   | AVG      | 10.34     | 34.55  | 50.00  | -15.45 |

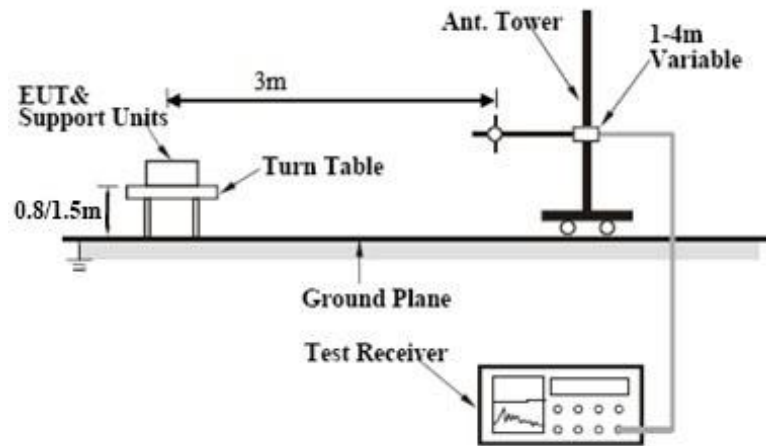
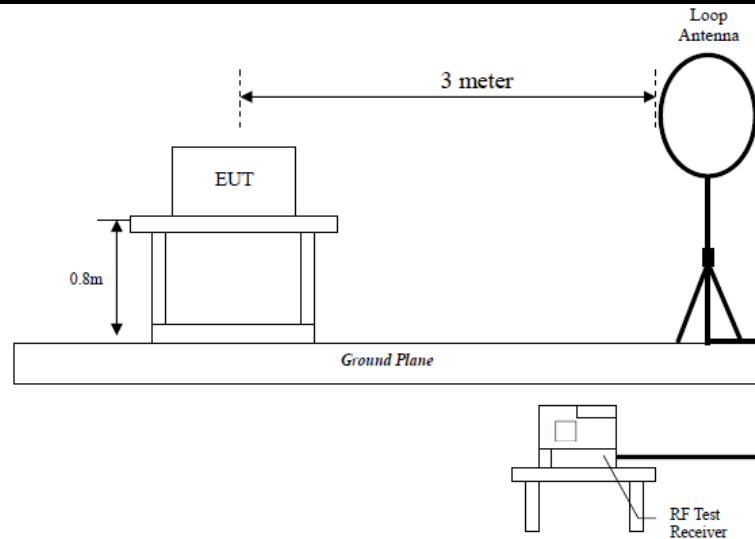
## 6.3 Radiated Spurious Emissions

|                      |                  |
|----------------------|------------------|
| Temperature          | 26°C             |
| Relative Humidity    | 56%              |
| Atmospheric Pressure | 1022mbar         |
| Test date :          | October 26, 2017 |
| Tested By :          | Loren Luo        |

### Requirement(s):

| Spec                                               | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Applicable                                       |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|------------------------------------------------|--------------|----|-----|------------------|----|-----|----------------|----|-----|-----------------|-----|------|-----------------------|-----------------------|-------------|-------------|-------------|--------------|------------|----|---------|-----|----------|-----|---------|-----|-----------|-----|--------------------------------------------------------------------------------------------------|
| §15.209,<br>§15.205,<br>§15.249(a) &<br>§15.249(d) | <p>The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission.</p> <p>The tighter limit applies at the band edges.</p> <p>The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:</p> <table><tr><th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/meter)</th><th>Field strength of harmonics (microvolts/meter)</th></tr><tr><td>902– 928 MHz</td><td>50</td><td>500</td></tr><tr><td>2400– 2483.5 MHz</td><td>50</td><td>500</td></tr><tr><td>5725– 5875 MHz</td><td>50</td><td>500</td></tr><tr><td>24.0– 24.25 GHz</td><td>250</td><td>2500</td></tr></table> <p>(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.</p> <table><tr><th>Frequency range (MHz)</th><th>Field Strength (µV/m)</th></tr><tr><td>0.009~0.490</td><td>2400/F(KHz)</td></tr><tr><td>0.490~1.705</td><td>24000/F(KHz)</td></tr><tr><td>1.705~30.0</td><td>30</td></tr><tr><td>30 – 88</td><td>100</td></tr><tr><td>88 – 216</td><td>150</td></tr><tr><td>216 960</td><td>200</td></tr><tr><td>Above 960</td><td>500</td></tr></table> | Fundamental frequency                            | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) | 902– 928 MHz | 50 | 500 | 2400– 2483.5 MHz | 50 | 500 | 5725– 5875 MHz | 50 | 500 | 24.0– 24.25 GHz | 250 | 2500 | Frequency range (MHz) | Field Strength (µV/m) | 0.009~0.490 | 2400/F(KHz) | 0.490~1.705 | 24000/F(KHz) | 1.705~30.0 | 30 | 30 – 88 | 100 | 88 – 216 | 150 | 216 960 | 200 | Above 960 | 500 | <div></div> |
|                                                    | Fundamental frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter)   |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 902– 928 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 50                                               | 500                                              |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 2400– 2483.5 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50                                               | 500                                              |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 5725– 5875 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 50                                               | 500                                              |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 24.0– 24.25 GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 250                                              | 2500                                             |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | Frequency range (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Field Strength (µV/m)                            |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 0.009~0.490                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2400/F(KHz)                                      |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 0.490~1.705                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 24000/F(KHz)                                     |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
|                                                    | 1.705~30.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30                                               |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
| 30 – 88                                            | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                  |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
| 88 – 216                                           | 150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                  |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
| 216 960                                            | 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                  |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |
| Above 960                                          | 500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                  |                                                  |                                                |              |    |     |                  |    |     |                |    |     |                 |     |      |                       |                       |             |             |             |              |            |    |         |     |          |     |         |     |           |     |                                                                                                  |

## Test Setup



## Procedure

- Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function
- For emission frequencies measured below 1GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1GHZ, a pre-scan also be performed with a meter measuring distance before final test.
- For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured in step 2.
- The search antenna is to be raised and lowered over a range from 1 to 4m in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, the change the orientation of EUT on the test table over a range from 0 to 360°. With a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer.

|                 |                |
|-----------------|----------------|
| Test Report No. | 17071118-FCC-R |
| Page            | 19 of 52       |

|        |                                                                                                                                                                                                                                                                                                   |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | <p>Vary the antenna position again and record the highest value as a final reading.</p> <ul style="list-style-type: none"> <li>- Repeat step 4 until all frequencies need to be measured was complete.</li> <li>- Repeat step5 with search antenna in vertical polarized orientations.</li> </ul> |
| Remark |                                                                                                                                                                                                                                                                                                   |
| Result | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                            |

Test Data ☒ Yes ☐ N/A  
 Test Plot ☒ Yes (See below) ☐ N/A

## Test Result:

|            |                   |
|------------|-------------------|
| Test Mode: | Transmitting Mode |
|------------|-------------------|

Frequency range: 9KHz - 30MHz

| Freq.<br>(MHz) | Detection<br>value | Factor<br>(dB/m) | Reading<br>(dBuV/m) | Result<br>(dBuV/m) | Limit@3m<br>(dBuV/m) | Margin<br>(dB) |
|----------------|--------------------|------------------|---------------------|--------------------|----------------------|----------------|
| --             | --                 | --               | --                  | --                 | --                   | >20            |
| --             | --                 | --               | --                  | --                 | --                   | >20            |

### Note:

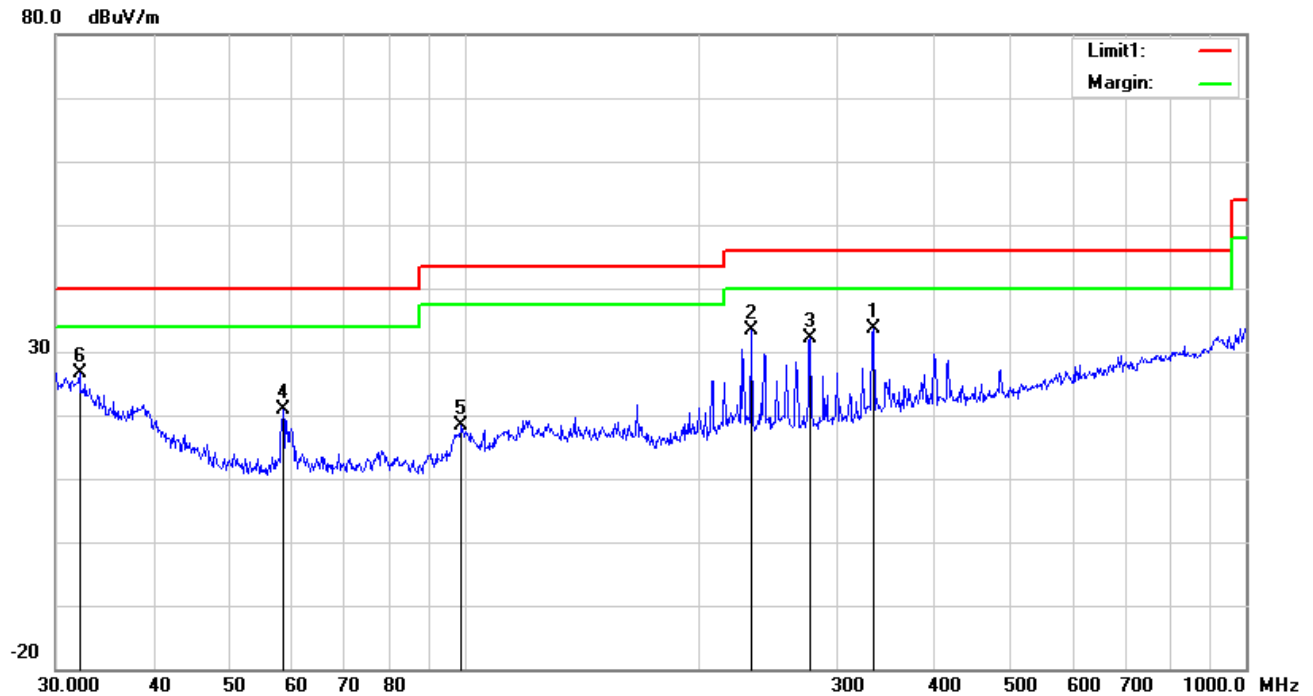
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

**Test Mode:** 2.4G Mode

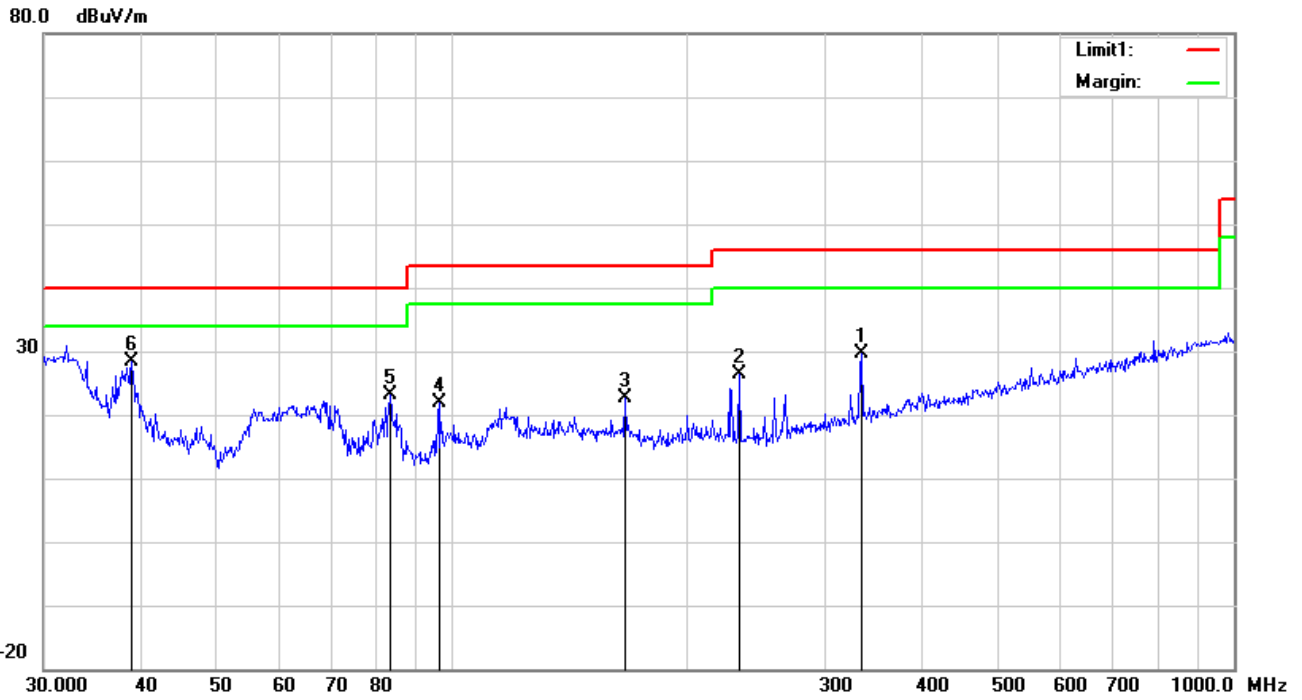
(Below 1GHz)



### Test Data

#### Horizontal Polarity Plot @3m

| No. | P/L | Frequency | Reading  | Detect or | Ant_F  | PA_G  | Cab_L | Result   | Limit    | Margin | Height | Degree |
|-----|-----|-----------|----------|-----------|--------|-------|-------|----------|----------|--------|--------|--------|
|     |     | (MHz)     | (dBuV/m) |           | (dB/m) | (dB)  | (dB)  | (dBuV/m) | (dBuV/m) | (dB)   | (cm)   | (°)    |
| 1   | H   | 333.6867  | 39.54    | peak      | 14.31  | 22.20 | 1.96  | 33.61    | 46.00    | -12.39 | 100    | 199    |
| 2   | H   | 232.5318  | 42.46    | peak      | 11.64  | 22.32 | 1.64  | 33.42    | 46.00    | -12.58 | 100    | 278    |
| 3   | H   | 277.0935  | 40.20    | peak      | 12.59  | 22.29 | 1.75  | 32.25    | 46.00    | -13.75 | 100    | 146    |
| 4   | H   | 58.6126   | 35.06    | peak      | 7.45   | 22.41 | 0.76  | 20.86    | 40.00    | -19.14 | 100    | 202    |
| 5   | H   | 99.1797   | 29.50    | peak      | 10.20  | 22.32 | 1.10  | 18.48    | 43.50    | -25.02 | 100    | 259    |
| 6   | H   | 32.1795   | 28.62    | peak      | 19.72  | 22.27 | 0.68  | 26.75    | 40.00    | -13.25 | 100    | 1      |



### Test Data

#### Vertical Polarity Plot @3m

| No. | P/L | Frequency | Reading  | Detect or | Ant_F  | PA_G  | Cab_L | Result   | Limit    | Margin | Height | Degr ee |
|-----|-----|-----------|----------|-----------|--------|-------|-------|----------|----------|--------|--------|---------|
|     |     | (MHz)     | (dBuV/m) |           | (dB/m) | (dB)  | (dB)  | (dBuV/m) | (dBuV/m) | (dB)   | (cm)   | ( )     |
| 1   | V   | 333.6867  | 35.61    | peak      | 14.31  | 22.20 | 1.96  | 29.68    | 46.00    | -16.32 | 100    | 183     |
| 2   | V   | 232.5318  | 35.52    | peak      | 11.64  | 22.32 | 1.64  | 26.48    | 46.00    | -19.52 | 100    | 32      |
| 3   | V   | 166.0680  | 31.29    | peak      | 12.11  | 22.26 | 1.37  | 22.51    | 43.50    | -20.99 | 100    | 265     |
| 4   | V   | 96.0986   | 33.62    | peak      | 9.46   | 22.32 | 1.02  | 21.78    | 43.50    | -21.72 | 200    | 54      |
| 5   | V   | 83.2298   | 36.77    | peak      | 7.73   | 22.39 | 1.06  | 23.17    | 40.00    | -16.83 | 100    | 20      |
| 6   | V   | 38.8879   | 35.22    | peak      | 14.71  | 22.27 | 0.78  | 28.44    | 40.00    | -11.56 | 100    | 284     |

## Above 1GHz

|            |           |
|------------|-----------|
| Test Mode: | 2.4G Mode |
|------------|-----------|

### Low Channel: GFSK Mode (Worst Case) (2402 MHz)

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4804            | 31.59               | AV               | V              | 33.39              | 7.22            | 48.46              | 23.74               | 54             | -30.26      |
| 4804            | 32.45               | AV               | H              | 33.39              | 7.22            | 48.46              | 24.6                | 54             | -29.4       |
| 4804            | 49.54               | PK               | V              | 33.39              | 7.22            | 48.46              | 41.69               | 74             | -32.31      |
| 4804            | 48.26               | PK               | H              | 33.39              | 7.22            | 48.46              | 40.41               | 74             | -33.59      |
| 1892.5          | 41.18               | AV               | V              | 26.68              | 4.85            | 46.54              | 26.17               | 54             | -27.83      |
| 1892.5          | 40.62               | AV               | H              | 26.68              | 4.85            | 46.54              | 25.61               | 54             | -28.39      |
| 1892.5          | 64.6                | PK               | V              | 26.68              | 4.85            | 46.54              | 49.59               | 74             | -24.41      |
| 1892.5          | 65.15               | PK               | H              | 26.68              | 4.85            | 46.54              | 50.14               | 74             | -23.86      |

### Middle Channel: GFSK Mode (Worst Case) (2441 MHz)

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4882            | 31.7                | AV               | V              | 33.62              | 7.53            | 48.36              | 24.49               | 54             | -29.51      |
| 4882            | 32.86               | AV               | H              | 33.62              | 7.53            | 48.36              | 25.65               | 54             | -28.35      |
| 4882            | 49.36               | PK               | V              | 33.62              | 7.53            | 48.36              | 42.15               | 74             | -31.85      |
| 4882            | 46.02               | PK               | H              | 33.62              | 7.53            | 48.36              | 38.81               | 74             | -35.19      |
| 13299           | 13.07               | AV               | V              | 41.23              | 14.38           | 46.52              | 22.16               | 54             | -31.84      |
| 13299           | 12.93               | AV               | H              | 41.23              | 14.38           | 46.52              | 22.02               | 54             | -31.98      |
| 13299           | 30.97               | PK               | V              | 41.23              | 14.38           | 46.52              | 40.06               | 74             | -33.94      |
| 13299           | 31.37               | PK               | H              | 41.23              | 14.38           | 46.52              | 40.46               | 74             | -33.54      |

**High Channel: GFSK Mode (Worst Case) (2480 MHz)**

| Frequency (MHz) | S.A. Reading (dBμV) | Detector (PK/AV) | Polarity (H/V) | Ant. Factor (dB/m) | Cable Loss (dB) | Pre-Amp. Gain (dB) | Cord. Amp. (dBμV/m) | Limit (dBμV/m) | Margin (dB) |
|-----------------|---------------------|------------------|----------------|--------------------|-----------------|--------------------|---------------------|----------------|-------------|
| 4960            | 38.65               | AV               | V              | 33.89              | 7.86            | 48.31              | 32.09               | 54             | -21.91      |
| 4960            | 36.6                | AV               | H              | 33.89              | 7.86            | 48.31              | 30.04               | 54             | -23.96      |
| 4960            | 49.02               | PK               | V              | 33.89              | 7.86            | 48.31              | 42.46               | 74             | -31.54      |
| 4960            | 48.3                | PK               | H              | 33.89              | 7.86            | 48.31              | 41.74               | 74             | -32.26      |
| 9435            | 22.72               | AV               | V              | 39.26              | 9.34            | 47.85              | 23.47               | 54             | -30.53      |
| 9435            | 21.81               | AV               | H              | 39.26              | 9.34            | 47.85              | 22.56               | 54             | -31.44      |
| 9435            | 37.96               | PK               | V              | 39.26              | 9.34            | 47.85              | 38.71               | 74             | -35.29      |
| 9435            | 39.98               | PK               | H              | 39.26              | 9.34            | 47.85              | 40.73               | 74             | -33.27      |

**Note:**

1, The testing has been conformed to  $10 \times 2480 \text{ MHz} = 24,800 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

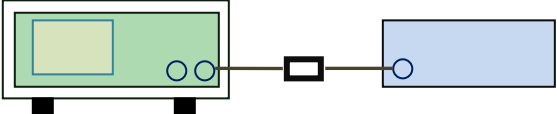
3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

4, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

## 6.4 Field Strength Measurement

|                      |                  |
|----------------------|------------------|
| Temperature          | 26 °C            |
| Relative Humidity    | 56%              |
| Atmospheric Pressure | 1022mbar         |
| Test date :          | October 26, 2017 |
| Tested By :          | Loren Luo        |

### Requirement(s):

| Spec                  | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Applicable                                      |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------|-------------------------------------------------|-------------------|----|-----|-----------------------|----|-----|---------------------|----|-----|----------------------|-----|------|-------------------------------------|
| §15.249(a)            | <table border="1"> <thead> <tr> <th>Fundamental frequency</th><th>Field strength of fundamental (millivolts/ meter)</th><th>Field strength of harmonics (microvolts/ meter)</th></tr> </thead> <tbody> <tr> <td>902–928 MHz .....</td><td>50</td><td>500</td></tr> <tr> <td>2400–2483.5 MHz .....</td><td>50</td><td>500</td></tr> <tr> <td>5725–5875 MHz .....</td><td>50</td><td>500</td></tr> <tr> <td>24.0–24.25 GHz .....</td><td>250</td><td>2500</td></tr> </tbody> </table> | Fundamental frequency                           | Field strength of fundamental (millivolts/ meter) | Field strength of harmonics (microvolts/ meter) | 902–928 MHz ..... | 50 | 500 | 2400–2483.5 MHz ..... | 50 | 500 | 5725–5875 MHz ..... | 50 | 500 | 24.0–24.25 GHz ..... | 250 | 2500 | <input checked="" type="checkbox"/> |
| Fundamental frequency | Field strength of fundamental (millivolts/ meter)                                                                                                                                                                                                                                                                                                                                                                                                                                   | Field strength of harmonics (microvolts/ meter) |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| 902–928 MHz .....     | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 500                                             |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| 2400–2483.5 MHz ..... | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 500                                             |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| 5725–5875 MHz .....   | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 500                                             |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| 24.0–24.25 GHz .....  | 250                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2500                                            |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| Test Setup            |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                  |                                                 |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| Test Procedure        | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.                                                                                                                                                                                                                            |                                                 |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| Remark                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |
| Result                | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                              |                                                 |                                                   |                                                 |                   |    |     |                       |    |     |                     |    |     |                      |     |      |                                     |

Test Data    ☒ Yes                      ☐ N/A

Test Plot    ☒ Yes (See below)                      ☐ N/A

|                   |                  |
|-------------------|------------------|
| <b>Test Mode:</b> | <b>2.4G Mode</b> |
|-------------------|------------------|

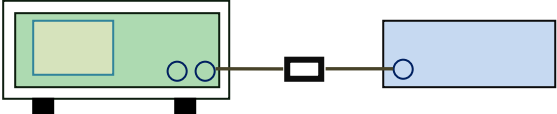
### Field Strength Measurement

| P/L | Frequency | Reading Level | Correct Factor | Measurement  | Limit  | Over   | Detector |
|-----|-----------|---------------|----------------|--------------|--------|--------|----------|
|     | (MHz)     | (dBuV/m)      | (dB)           | (dBuV/m)     | (dB/m) | (dB)   |          |
| H   | 2402      | 92.7          | -18.1          | 74.6         | 114    | -39.4  | peak     |
| H   | 2402      | 78.68         | -18.1          | 60.58        | 94     | -33.42 | AVG      |
| V   | 2402      | 84.5          | -18.1          | 66.4         | 114    | -47.6  | peak     |
| V   | 2402      | 72.84         | -18.1          | 54.74        | 94     | -39.26 | AVG      |
| H   | 2441      | 93.63         | -18.05         | <b>75.58</b> | 114    | -38.42 | peak     |
| H   | 2441      | 75.35         | -18.05         | 57.3         | 94     | -36.7  | AVG      |
| V   | 2441      | 79.48         | -18.05         | 61.43        | 114    | -52.57 | peak     |
| V   | 2441      | 64.31         | -18.05         | 46.26        | 94     | -47.74 | AVG      |
| H   | 2480      | 76.95         | -18.03         | 58.92        | 114    | -55.08 | peak     |
| H   | 2480      | 62.3          | -18.03         | 44.27        | 94     | -49.73 | AVG      |
| V   | 2480      | 79.19         | -18.03         | 61.16        | 114    | -52.84 | peak     |
| V   | 2480      | 62.55         | -18.03         | 44.52        | 94     | -49.48 | AVG      |

## 6.5 20dB Bandwidth Testing

|                      |                  |
|----------------------|------------------|
| Temperature          | 26 °C            |
| Relative Humidity    | 56%              |
| Atmospheric Pressure | 1022mbar         |
| Test date :          | October 26, 2017 |
| Tested By :          | Loren Luo        |

### Requirement(s):

| Spec           | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Requirement                                                                                                                                                                                                                                                                                                                                              | Applicable                          |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| §15.215(c)     | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Radiated Emissions Measurement Uncertainty<br>All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz ( 3m & 10m ) & 1GHz above ( 3m ) is +5.6/-4.5dB. | <input checked="" type="checkbox"/> |
| Test Setup     |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                          |                                     |
| Test Procedure | <ul style="list-style-type: none"> <li>- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.</li> <li>- Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.</li> <li>- Repeat above procedures until all frequencies measured were complete.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                          |                                     |
| Remark         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                          |                                     |

|        |                                          |                               |
|--------|------------------------------------------|-------------------------------|
| Result | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail |
|--------|------------------------------------------|-------------------------------|

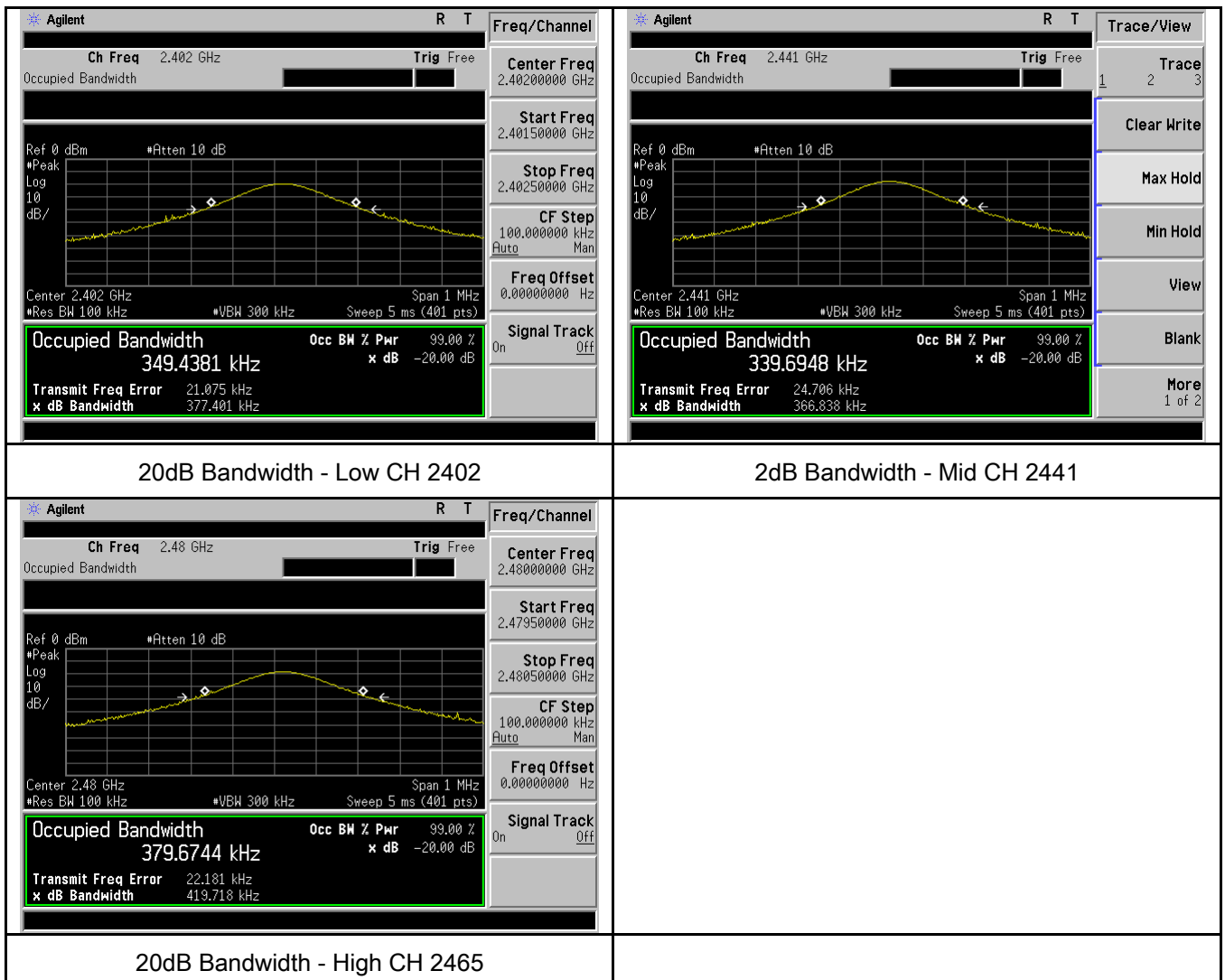
|           |                                                     |                              |
|-----------|-----------------------------------------------------|------------------------------|
| Test Data | <input checked="" type="checkbox"/> Yes             | <input type="checkbox"/> N/A |
| Test Plot | <input checked="" type="checkbox"/> Yes (See below) | <input type="checkbox"/> N/A |

## 20dB Bandwidth measurement result

| CH     | Fundamental Frequency (MHz) | 20dB Bandwidth ( MHz ) | Result |
|--------|-----------------------------|------------------------|--------|
| Low    | 2402                        | 0.377                  | Pass   |
| Middle | 2441                        | 0.366                  | Pass   |
| High   | 2480                        | 0.419                  | Pass   |

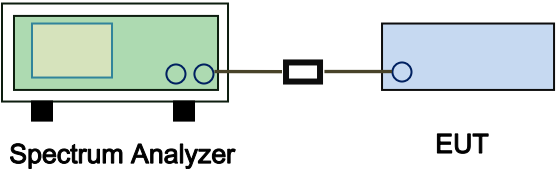
## Test Plots

### 20dB Bandwidth measurement result



## 6.6 Band Edge

|                      |                  |
|----------------------|------------------|
| Temperature          | 23 °C            |
| Relative Humidity    | 54%              |
| Atmospheric Pressure | 1020mbar         |
| Test date :          | October 28, 2017 |
| Tested By :          | Loren Luo        |

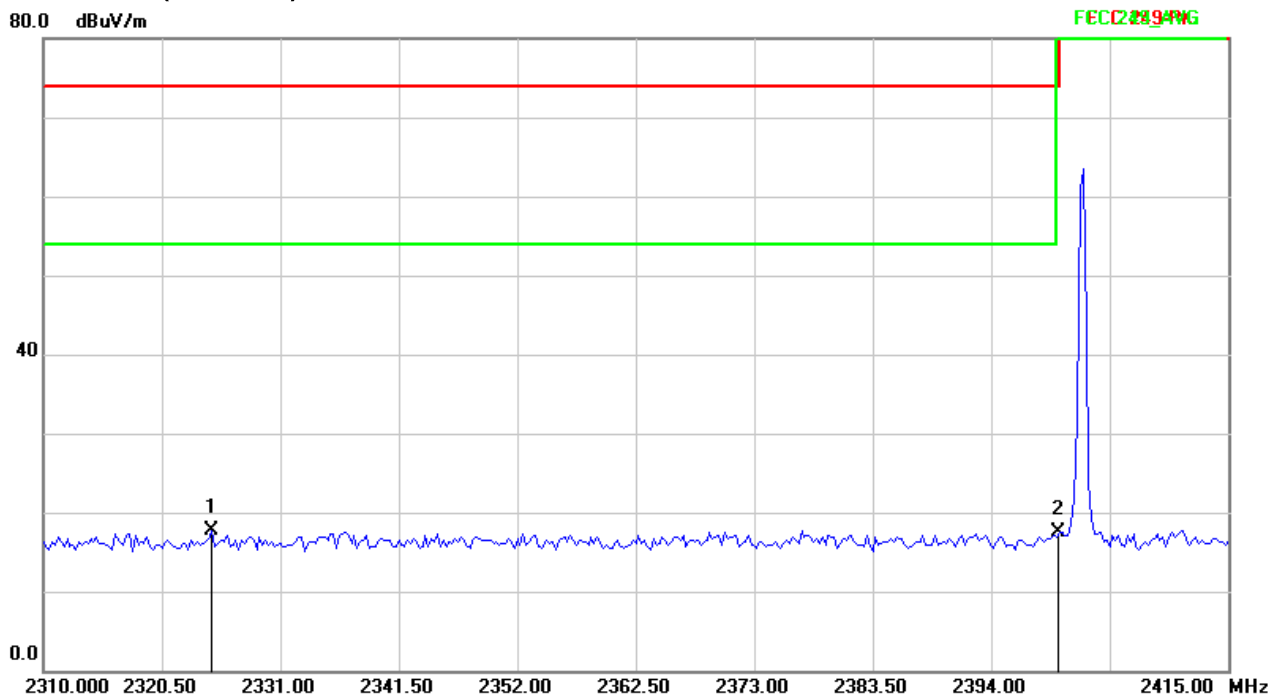
| Spec           | Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Requirement                                                                                                                                                                                                                                             | Applicable                          |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| §15.249(d)     | a)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. | <input checked="" type="checkbox"/> |
| Test Setup     |  <p style="text-align: center;">Spectrum Analyzer                      EUT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                         |                                     |
| Test Procedure | <ul style="list-style-type: none"> <li>- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.</li> <li>- Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.</li> <li>- Set both RBW and VBW of spectrum analyzer to 1MHz.</li> <li>- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.</li> <li>- Repeat above procedures until all measured frequencies were complete.</li> </ul> |                                                                                                                                                                                                                                                         |                                     |
| Remark         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                         |                                     |
| Result         | <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                         |                                     |

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

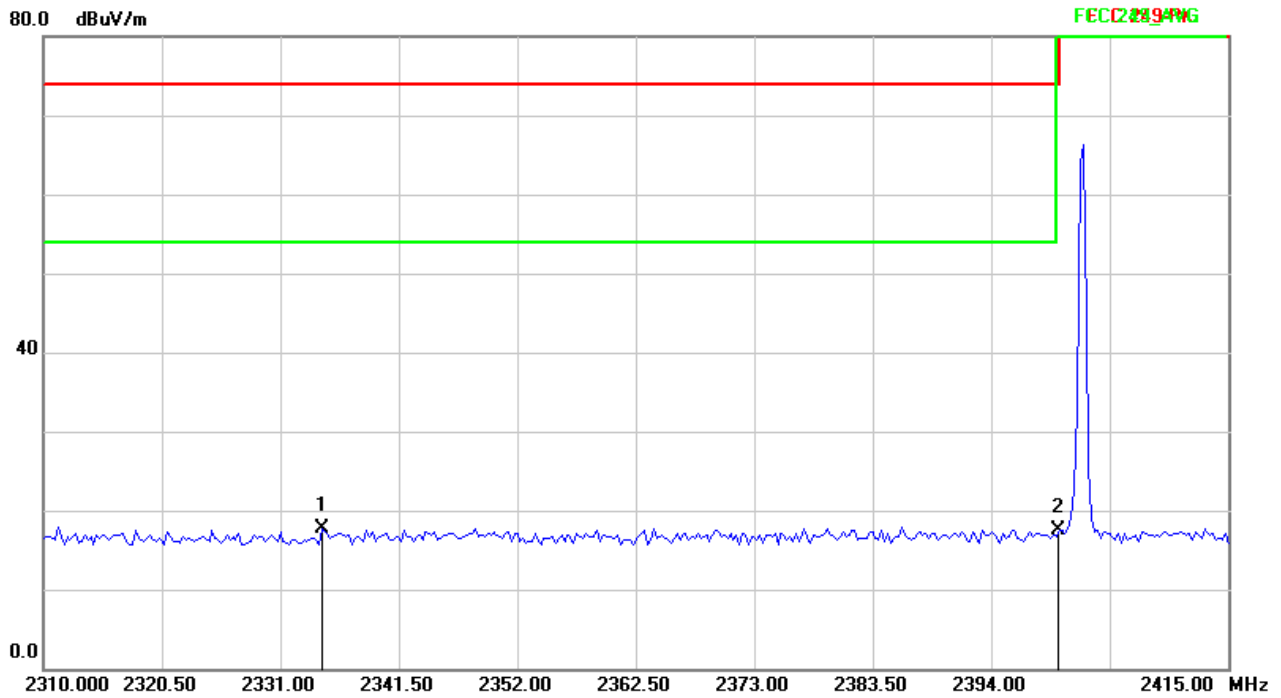
## Test Plots

### Low Channel (2402 MHz)



### Test Data

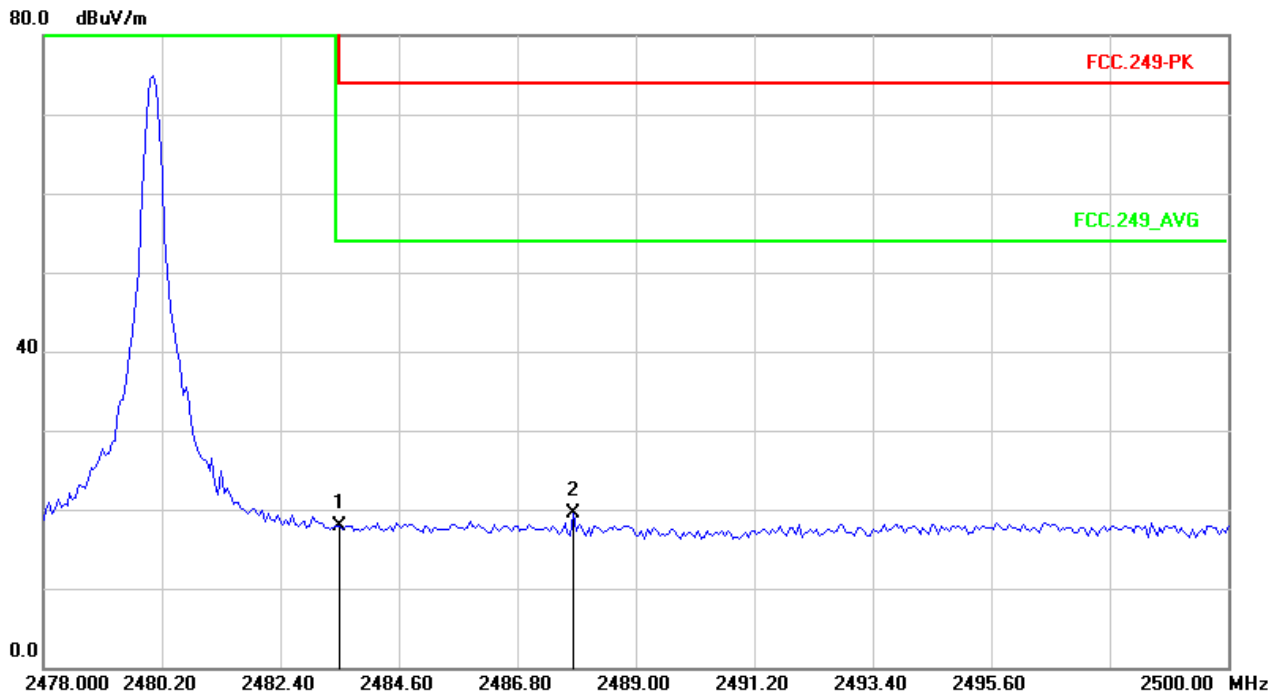
| No. | P/L | Frequency | Reading Level | Correct Factor | Measurement | Limit  | Over   | Detect or | Height | Degree |
|-----|-----|-----------|---------------|----------------|-------------|--------|--------|-----------|--------|--------|
|     |     | (MHz)     | (dBuV/m)      | (dB)           | (dBuV/m)    | (dB/m) | (dB)   |           | (cm)   | ( ° )  |
| 1   | H   | 2324.963  | 35.83         | -18.17         | 17.66       | 74.00  | -56.34 | peak      | 180    | 346    |
| 2   | H   | 2400.000  | 35.63         | -18.10         | 17.53       | 74.00  | -56.47 | peak      | 180    | 276    |



### Test Data

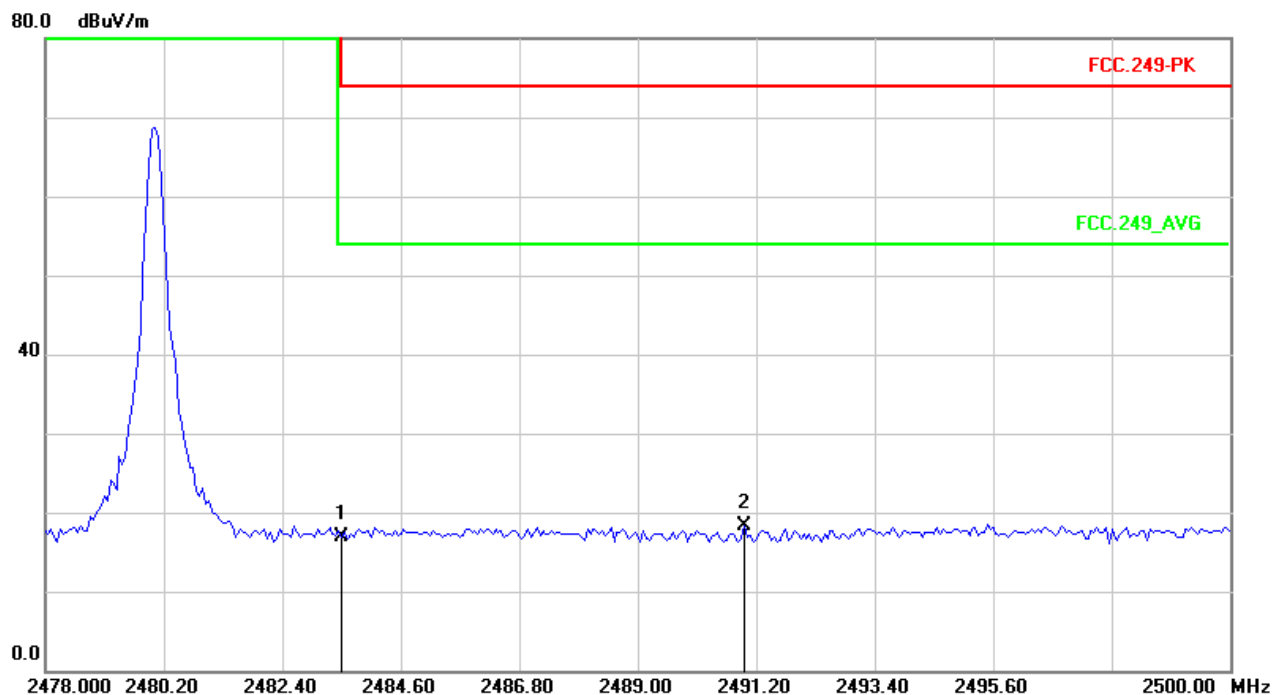
| No. | P/L | Frequency | Reading Level | Correct Factor | Measurement | Limit  | Over   | Detect or | Height | Degree |
|-----|-----|-----------|---------------|----------------|-------------|--------|--------|-----------|--------|--------|
|     |     | (MHz)     | (dBuV/m)      | (dB)           | (dBuV/m)    | (dB/m) | (dB)   |           | (cm)   | (°)    |
| 1   | V   | 2334.675  | 35.86         | -18.16         | 17.70       | 74.00  | -56.30 | peak      | 180    | 364    |
| 2   | V   | 2400.000  | 35.51         | -18.10         | 17.41       | 74.00  | -56.59 | peak      | 180    | 267    |

### High Channel (2480 MHz)



### Test Data

| No. | P/L | Frequency | Reading  | Correct | Measur   | Limit  | Over   | Detect | Height | Degree |
|-----|-----|-----------|----------|---------|----------|--------|--------|--------|--------|--------|
|     |     | (MHz)     | Level    | Factor  | ement    |        |        | or     | (cm)   | ( ° )  |
|     |     |           | (dBuV/m) | (dB)    | (dBuV/m) | (dB/m) | (dB)   |        |        |        |
| 1   | H   | 2483.500  | 35.83    | -18.01  | 17.82    | 74.00  | -56.18 | peak   | 149    | 265    |
| 2   | H   | 2487.845  | 37.50    | -18.01  | 19.49    | 74.00  | -54.51 | peak   | 198    | 325    |



**Test Data**

| No. | P/L | Frequency | Reading Level | Correct Factor | Measurement | Limit  | Over   | Detect or | Height | Degree |
|-----|-----|-----------|---------------|----------------|-------------|--------|--------|-----------|--------|--------|
|     |     | (MHz)     | (dBuV/m)      | (dB)           | (dBuV/m)    | (dB/m) | (dB)   |           | (cm)   | (°)    |
| 1   | V   | 2483.500  | 34.90         | -18.01         | 16.89       | 74.00  | -57.11 | peak      | 196    | 323    |
| 2   | V   | 2490.980  | 36.40         | -18.01         | 18.39       | 74.00  | -55.61 | peak      | 176    | 259    |

## Annex A. TEST INSTRUMENT

| Instrument                           | Model    | Serial #    | Cal Date   | Cal Due    | In use                              |
|--------------------------------------|----------|-------------|------------|------------|-------------------------------------|
| <b>AC Line Conducted</b>             |          |             |            |            |                                     |
| EMI test receiver                    | ESCS30   | 8471241027  | 09/15/2017 | 09/14/2018 | <input checked="" type="checkbox"/> |
| Line Impedance                       | LI-125A  | 191106      | 09/23/2017 | 09/22/2018 | <input checked="" type="checkbox"/> |
| Line Impedance                       | LI-125A  | 191107      | 09/23/2017 | 09/22/2018 | <input checked="" type="checkbox"/> |
| ISN                                  | ISN T800 | 34373       | 09/23/2017 | 09/22/2018 | <input checked="" type="checkbox"/> |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118   | 71283       | 09/22/2017 | 09/21/2018 | <input checked="" type="checkbox"/> |
| Transient Limiter                    | LIT-153  | 531118      | 08/30/2017 | 08/29/2018 | <input checked="" type="checkbox"/> |
| <b>RF conducted test</b>             |          |             |            |            |                                     |
| Agilent ESA-E SERIES                 | E4407B   | MY45108319  | 09/15/2017 | 09/14/2018 | <input checked="" type="checkbox"/> |
| Power Splitter                       | 1#       | 1#          | 08/30/2017 | 08/29/2018 | <input checked="" type="checkbox"/> |
| DC Power Supply                      | E3640A   | MY40004013  | 09/15/2017 | 09/14/2018 | <input checked="" type="checkbox"/> |
| <b>Radiated Emissions</b>            |          |             |            |            |                                     |
| EMI test receiver                    | ESL6     | 100262      | 09/15/2017 | 09/14/2018 | <input checked="" type="checkbox"/> |
| Positioning Controller               | UC3000   | MF780208282 | 11/17/2017 | 11/16/2018 | <input checked="" type="checkbox"/> |
| OPT 010 AMPLIFIER (0.1-1300MHz)      | 8447E    | 2727A02430  | 08/30/2017 | 08/29/2018 | <input checked="" type="checkbox"/> |
| Active Antenna (9kHz-30MHz)          | AL-130   | 121031      | 10/12/2017 | 10/11/2018 | <input checked="" type="checkbox"/> |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B    | 3008A02402  | 03/23/2017 | 03/22/2018 | <input checked="" type="checkbox"/> |
| Active Antenna (9kHz-30MHz)          | AL-130   | 121031      | 10/12/2017 | 10/11/2018 | <input checked="" type="checkbox"/> |
| Bilog Antenna (30MHz~6GHz)           | JB6      | A110712     | 09/19/2017 | 09/18/2018 | <input checked="" type="checkbox"/> |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118   | 71283       | 09/22/2017 | 09/21/2018 | <input checked="" type="checkbox"/> |

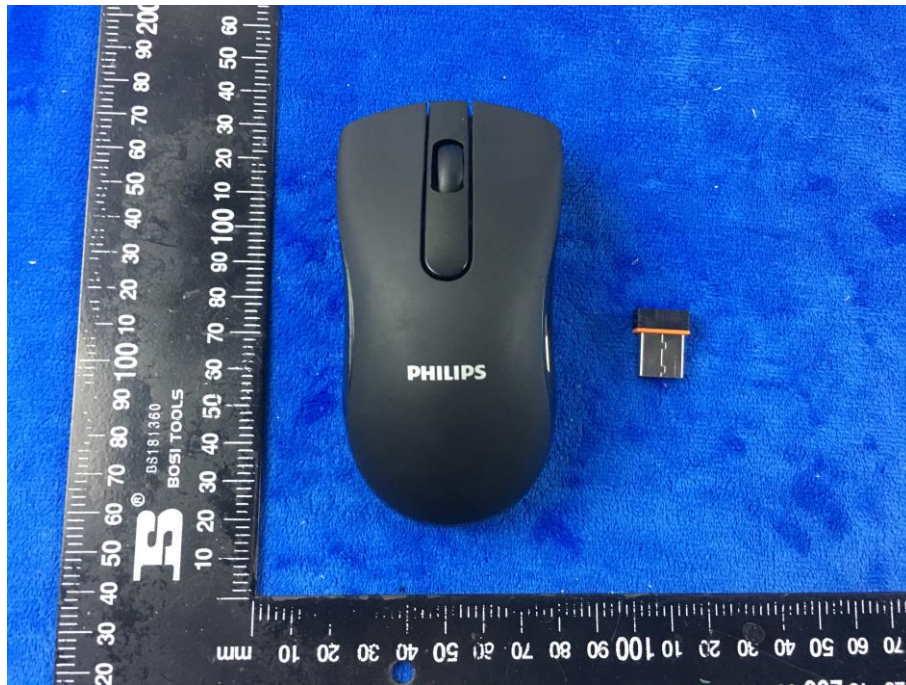
|                 |                |
|-----------------|----------------|
| Test Report No. | 17071118-FCC-R |
| Page            | 35 of 52       |

|                                         |        |        |            |            |                                     |
|-----------------------------------------|--------|--------|------------|------------|-------------------------------------|
| Universal Radio<br>Communication Tester | CMU200 | 121393 | 09/23/2017 | 09/22/2018 | <input checked="" type="checkbox"/> |
|-----------------------------------------|--------|--------|------------|------------|-------------------------------------|

## Annex B. EUT And Test Setup Photographs

### Annex B.i. Photograph: EUT External Photo

Whole Package View



EUT - Front View ( TX )



EUT - Rear View ( TX )



EUT - Top View ( TX )



EUT - Bottom View ( TX )



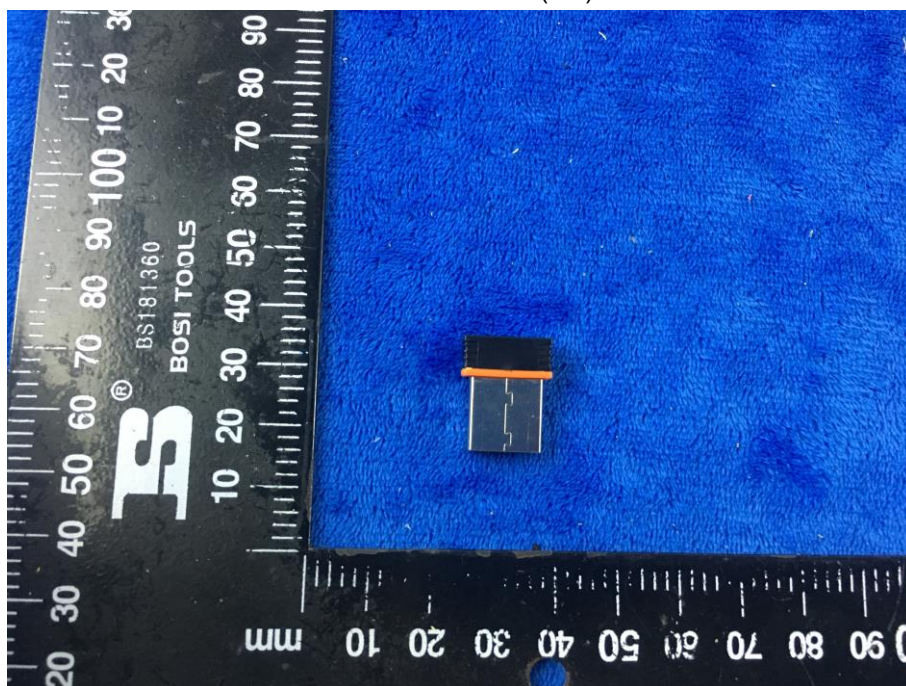
EUT - Left View ( TX )



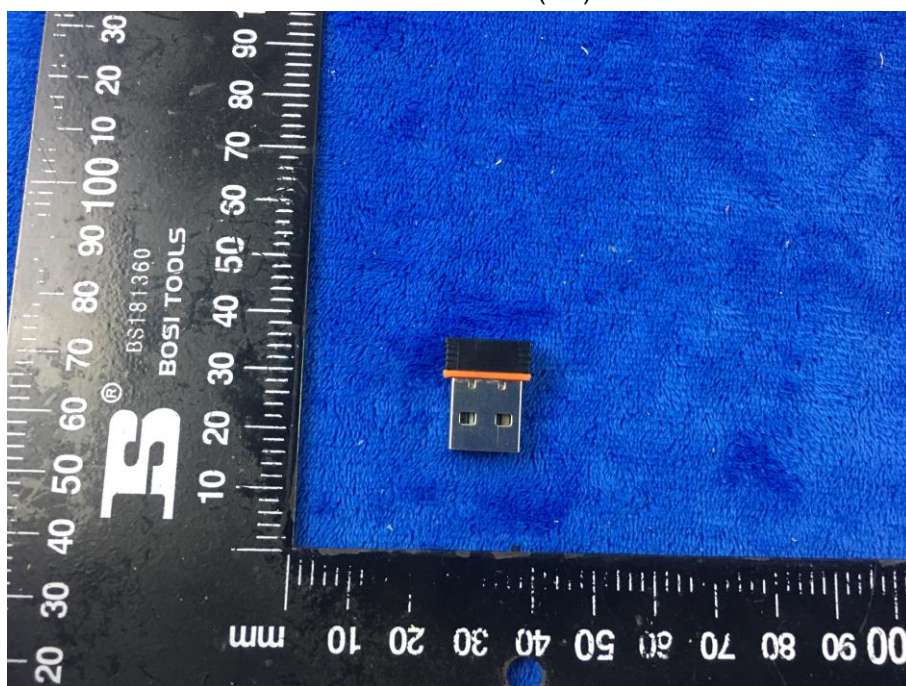
EUT - Right View ( TX )



EUT - Front View (RX)



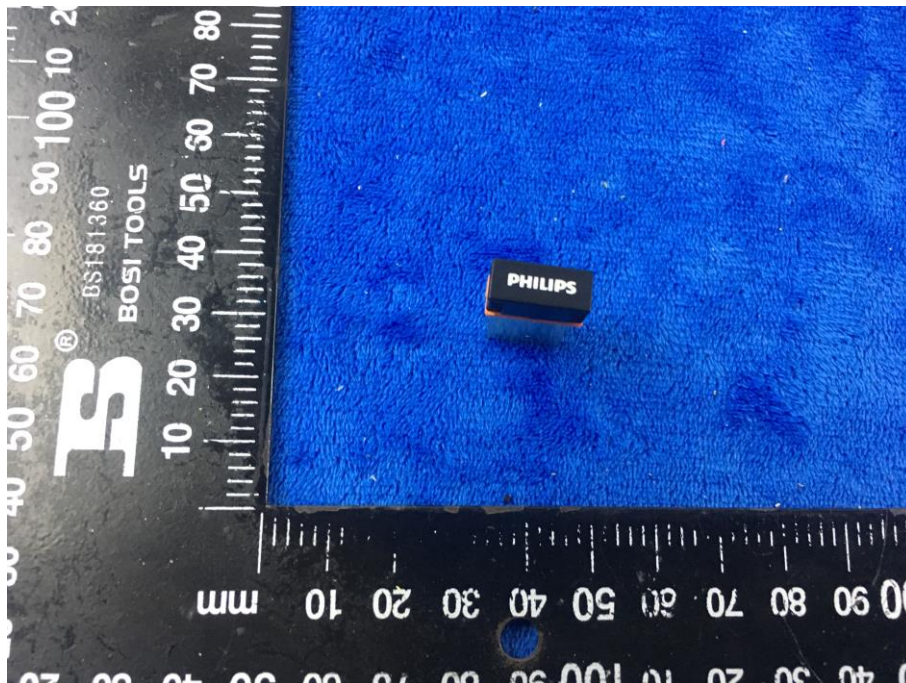
EUT - Rear View (RX)



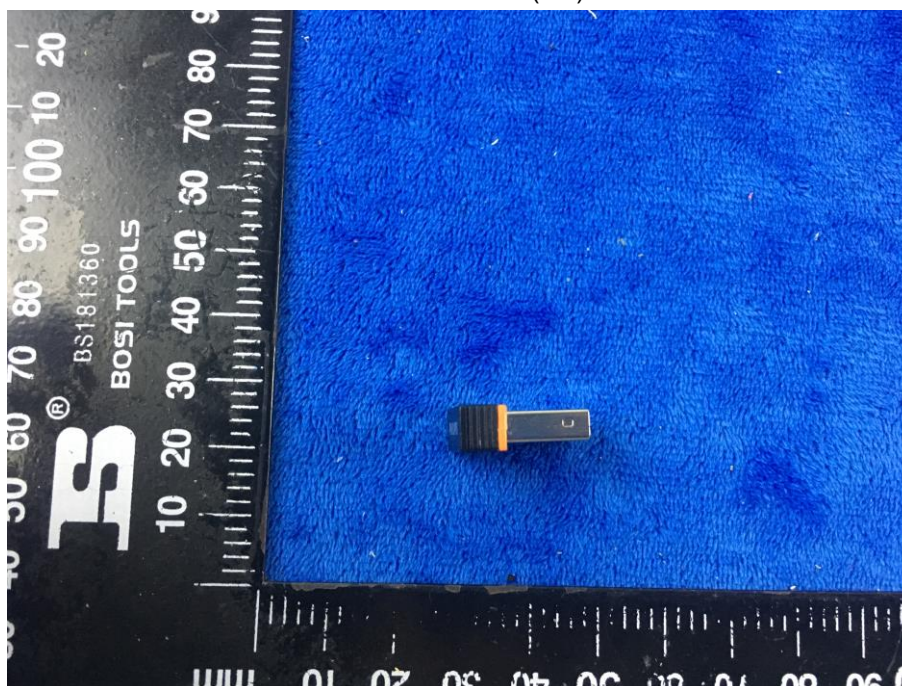
EUT - Top View (RX)



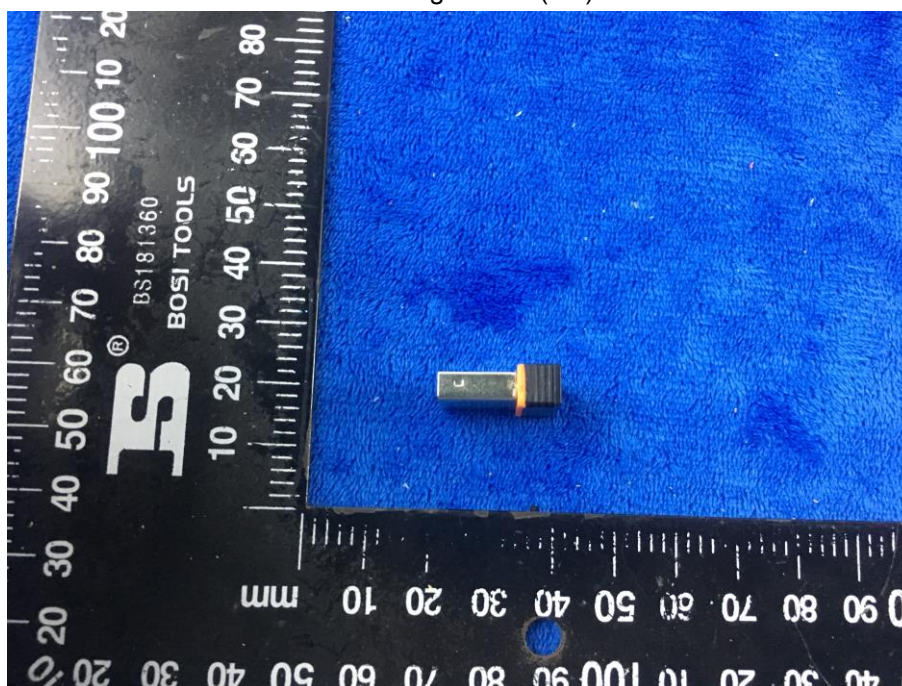
EUT - Bottom View (RX)



EUT - Left View (RX)



EUT - Right View (RX)

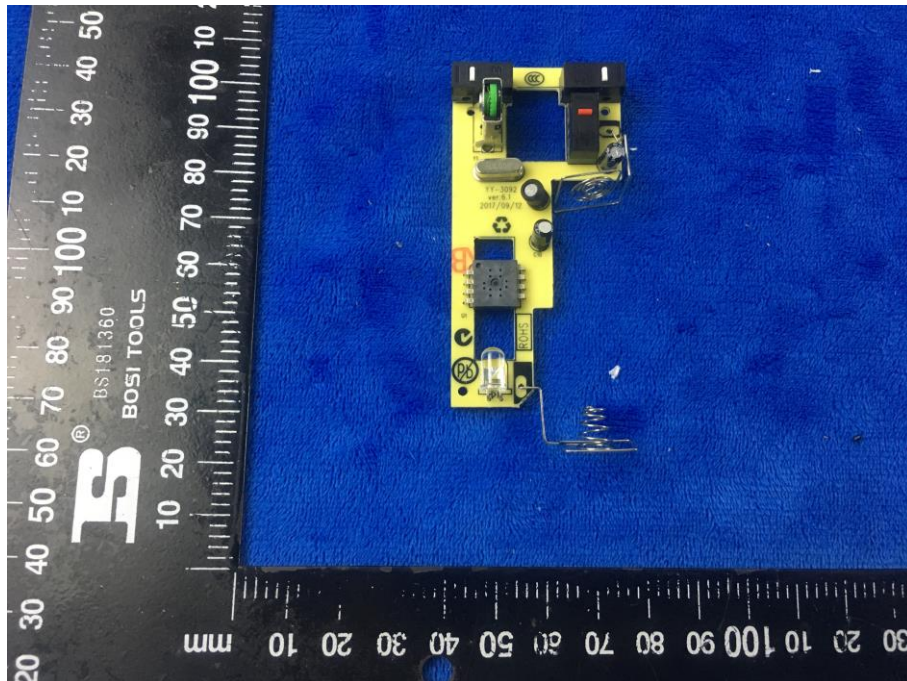


**Annex B.ii. Photograph: EUT Internal Photo**

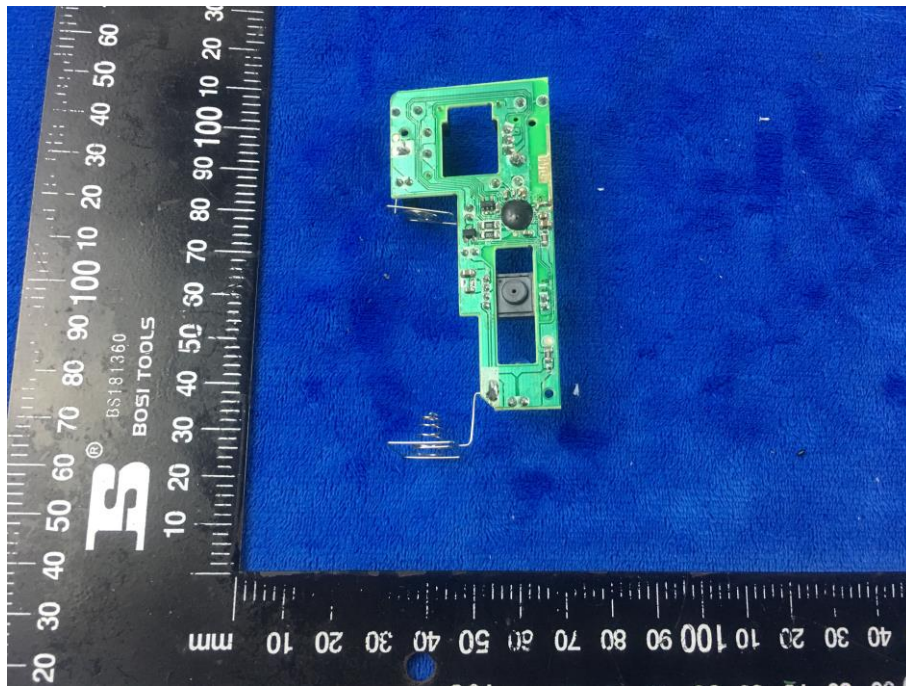
Cover Off - Top View 1 (TX)



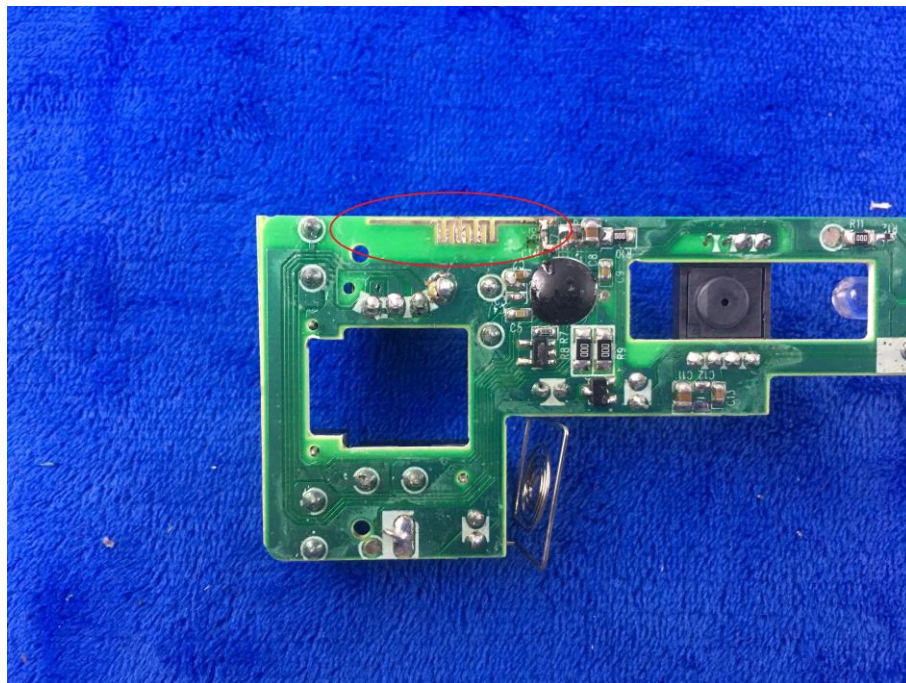
Mainboard - Front View (TX)



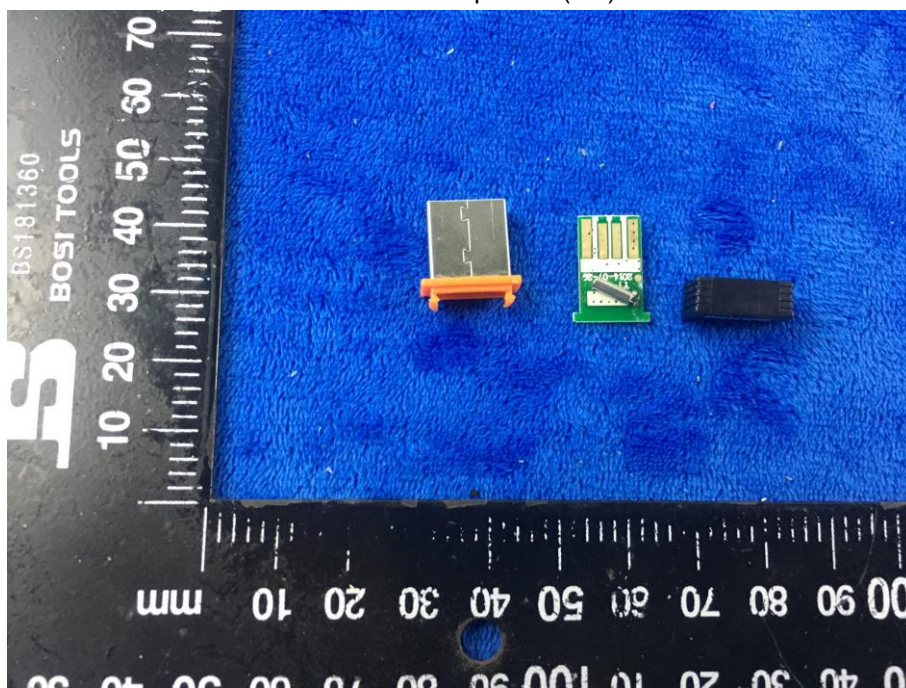
Mainboard – Rear View (TX)



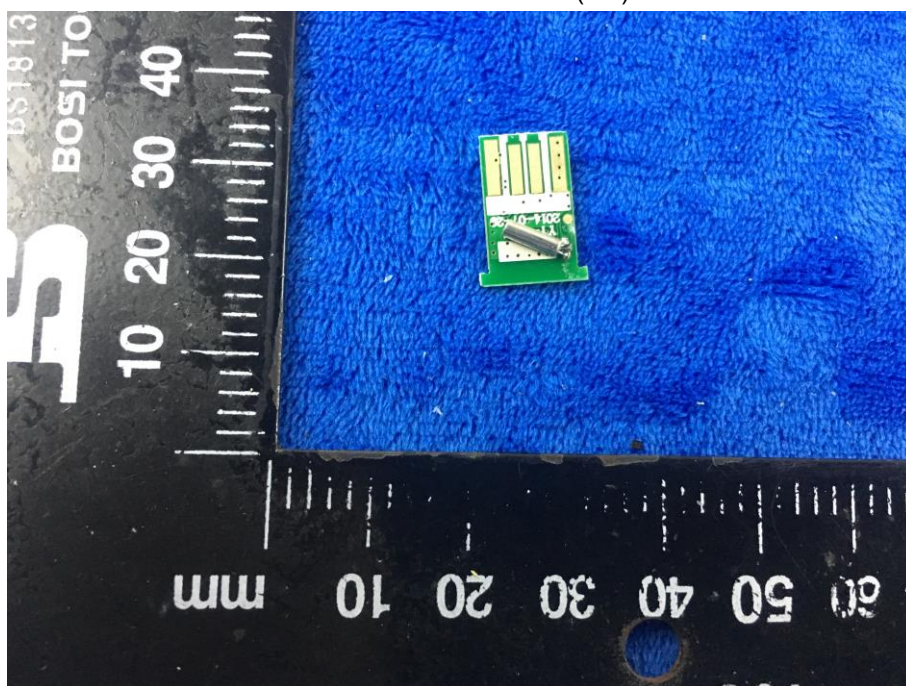
Antenna View (TX)



Cover Off - Top View (RX)

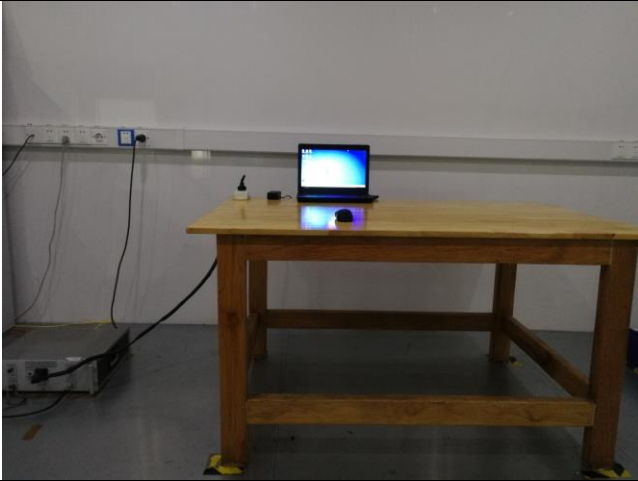


Mainboard - Front View (RX)





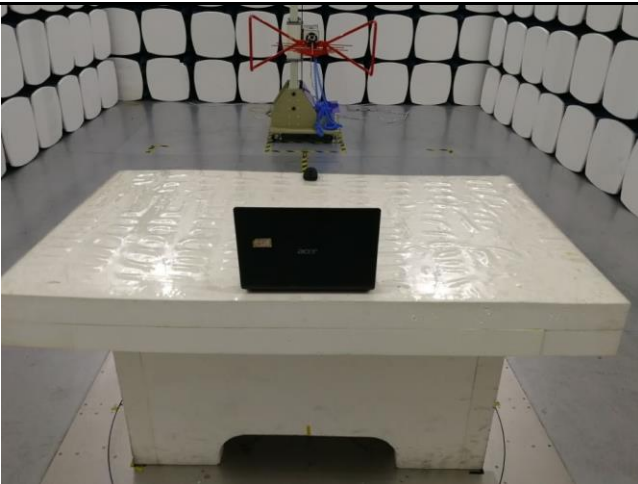
**Annex B.iii. Photograph: Test Setup Photo**



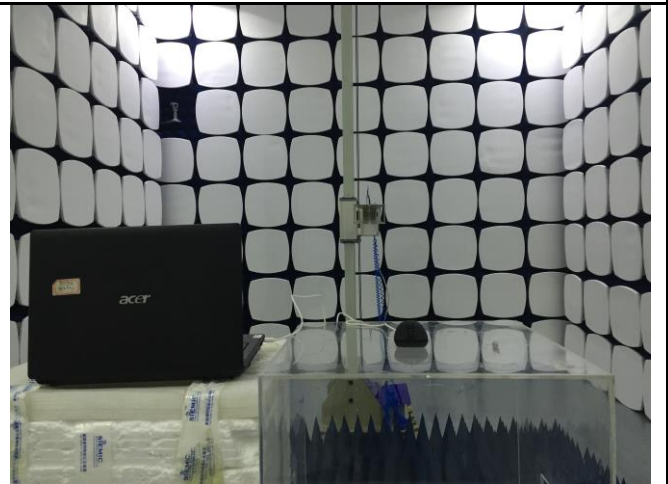
Conducted Emissions Test Setup Front View



Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz

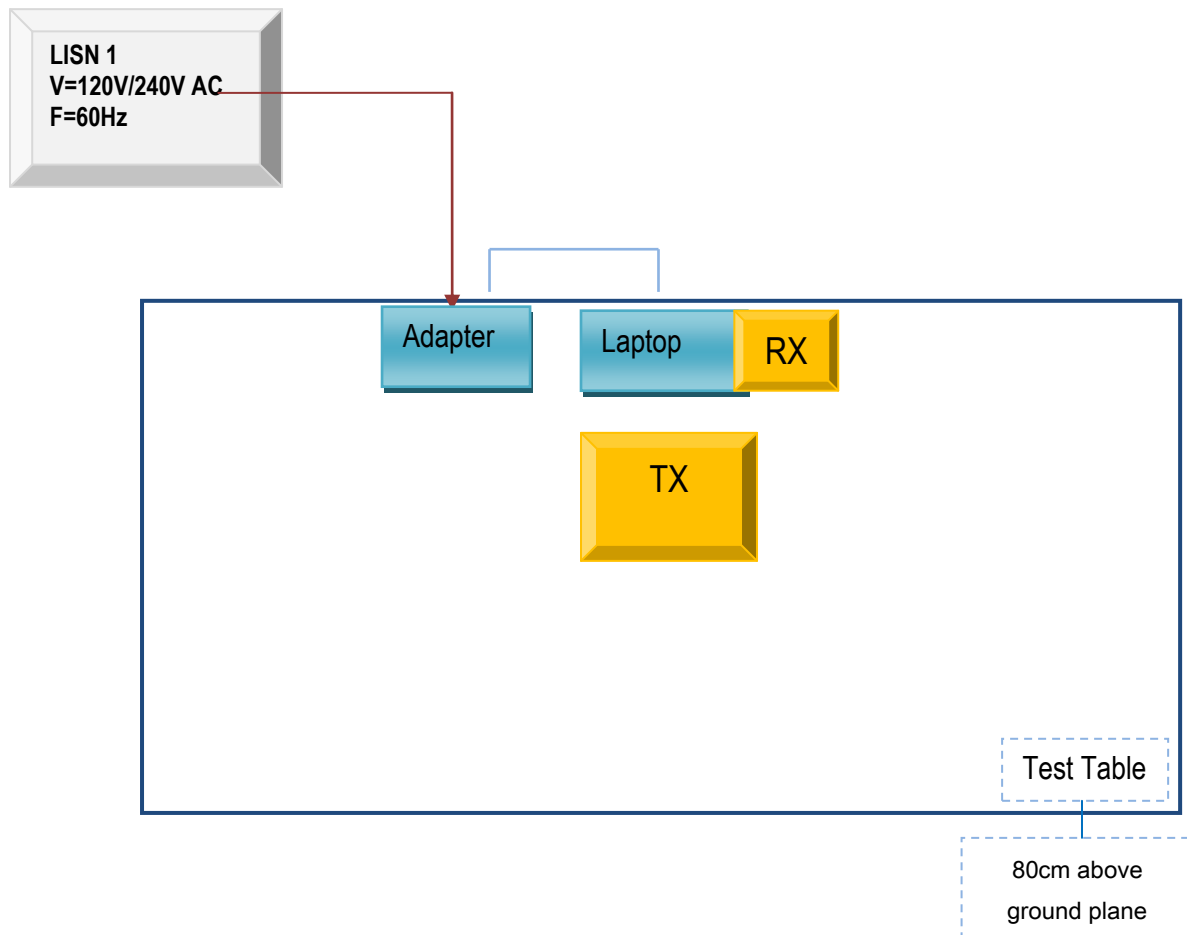


Radiated Spurious Emissions Test Setup Above 1GHz

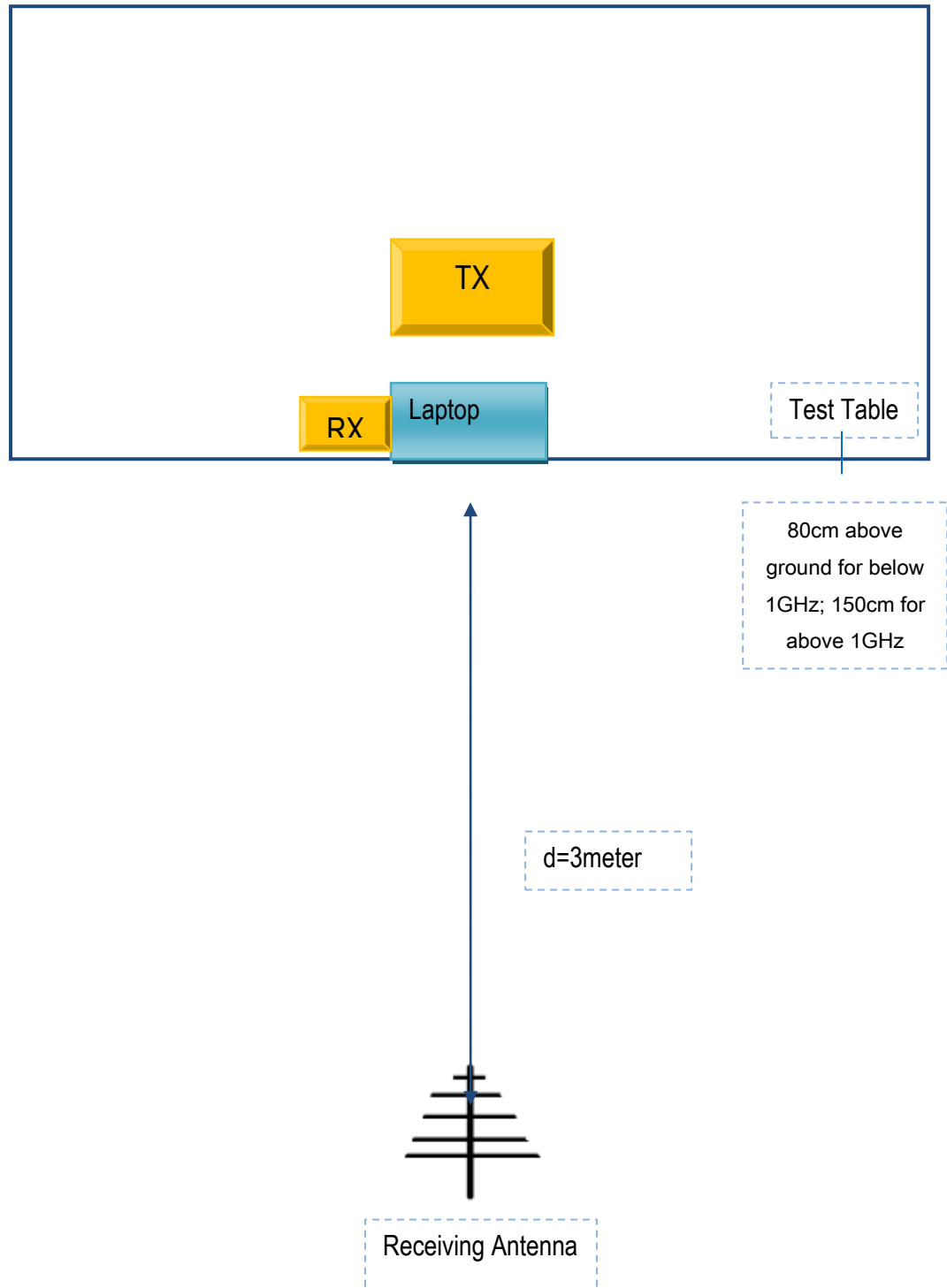
## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

#### Block Configuration Diagram for AC Line Conducted Emissions



### Block Configuration Diagram for Radiated Emissions



## **Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION**

The following is a description of supporting equipment and details of cables used with the EUT.

| Manufacturer | Equipment Description | Model   | Serial No. |
|--------------|-----------------------|---------|------------|
| Lenovo       | Laptop                | E40     | N/A        |
| Lenovo       | AC Adapter            | 42T4416 | 21D9JU     |

## Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see attachment

## Annex E. DECLARATION OF SIMILARITY

### Shenzhen Youyuanhongye Electronic Co., Ltd.

#### Family models declaration letter.

2017-11-01

We

Shenzhen Youyuanhongye Electronic Co., Ltd.

Of

18th Building,Zhengfeng South Road,No.4 Unit Huaide Cuigang Industrial Park,Fuyong  
Street,Bao'an District,Shenzhen City,P.R.China.

Product: Wireless Mouse

Model Name: **SPK7211**

Serial Model: SPK7211W, SPK7211B, SPK7211P, SPK7322, SPK7211PS,  
SPK7221B, SPK7221W, SPK7211BSC, SPK7402W, SPK7402B, SPK7402WS,  
SPK7402BS, SPK7211WSC, SPT6501W, SPT6501B, SPT6501BS, SPT6602,  
W1020, W1080, W1040, W1050, MW291, MW286, MW287, MW692, W1040X,  
GMW201, GW103, GW102-Pro, GW101-Pro, GW104, CW1260, CW6262, CW1261,  
MW2027, MW2082, MW2091, MW2022, MW2093, M2082, M2032, M2088,  
MW2032, M2108, M2022, M2087, M2030, MW2088, MW2092, MW2030, M2106.

All the model are the same circuit and RF module,except model names.

Thanks

Sincerely,

Signature *xingliao Xie*

Name: xingliao xie Date: 2017-11-01

Title: Manager