

# EMF TEST REPORT

**Test Report No.** : OT-237-RWD-050

**Reception No.** : 2301000279

**Applicant** : LG Electronics USA, Inc.

**Address** : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States

**Manufacturer** : LG Electronics Inc.

**Address** : 222 LG-ro, Jinwi-Myeon, Pyeongtaek -Si, Gyeonggi-Do, 451-713, Korea

**Type of Equipment** : Silverbox RADIO ASM-RECEIVER

**FCC ID.** : BEJVCUEB-N

**Model Name** : VCUEB-N

**Multiple Model Name** : N/A

**Serial number** : N/A

**Total page of Report** : 9 pages (including this page)

**Date of Incoming** : January 31, 2023

**Date of issue** : July 26, 2023

## SUMMARY

The equipment complies with the regulation; **CFR §2.1093**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.



Tested by  
Sieon Lee / Sr. Engineer  
ONETECH Corp.



Reviewed by  
Tae-Ho, Kim / Chief Engineer  
ONETECH Corp.



Approved by  
Jae-Ho Lee / Chief Engineer  
ONETECH Corp.

## CONTENTS

**PAGE**

|                                                                                |          |
|--------------------------------------------------------------------------------|----------|
| <b>1. VERIFICATION OF COMPLIANCE .....</b>                                     | <b>4</b> |
| <b>2. GENERAL INFORMATION.....</b>                                             | <b>5</b> |
| <b>2.1 PRODUCT DESCRIPTION.....</b>                                            | <b>5</b> |
| <b>2.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....</b> | <b>6</b> |
| <b>3. EUT MODIFICATIONS.....</b>                                               | <b>6</b> |
| <b>4. MAXIMUM PERMISSIBLE EXPOSURE.....</b>                                    | <b>7</b> |
| <b>4.1 RF EXPOSURE CALCULATION .....</b>                                       | <b>7</b> |
| <b>4.2 EUT DESCRIPTION.....</b>                                                | <b>7</b> |
| <b>4.3 TEST RESULT .....</b>                                                   | <b>8</b> |
| <b>4.3.1 Test data for WLAN [Internal Antenna].....</b>                        | <b>8</b> |
| <b>4.3.2 Test data for WLAN [External Antenna].....</b>                        | <b>8</b> |
| <b>4.3.3 Test data for Bluetooth [Internal Antenna] .....</b>                  | <b>8</b> |
| <b>4.4 TEST DATA FOR INTERMODULATION TRANSMIT .....</b>                        | <b>9</b> |

**Revision History**

| Rev. No. | Issue Report No. | Issued Date   | Revisions       | Section Affected |
|----------|------------------|---------------|-----------------|------------------|
| 0        | OT-237-RWD-050   | July 26, 2023 | Initial Release | All              |
|          |                  |               |                 |                  |
|          |                  |               |                 |                  |

## 1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA, Inc.

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States

Contact Person : Sung Soo Kim / Director, Regulatory and Environmental Affairs

Telephone No. : +201-266-2215

FCC ID : BEJVCUEB-N

Model Name : VCUEB-N

Brand Name : -

Serial Number : N/A

Date : July 26, 2023

|                                                         |                                                 |
|---------------------------------------------------------|-------------------------------------------------|
| E.U.T. DESCRIPTION                                      | Silverbox RADIO ASM-RECEIVER                    |
| THIS REPORT CONCERNS                                    | Original Grant                                  |
| MEASUREMENT PROCEDURES                                  | KDB 447498 D01 General RF Exposure Guidance v06 |
| TYPE OF EQUIPMENT TESTED                                | Pre-Production                                  |
| KIND OF EQUIPMENT<br>AUTHORIZATION REQUESTED            | Certification                                   |
| Modifications on the Equipment to<br>Achieve Compliance | None                                            |

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The LG Electronics USA, Inc., Model VCUEB-N (referred to as the EUT in this report) is a Silverbox RADIO ASM-RECEIVER. The product specification described herein was obtained from product data sheet or user's manual.

|                        |                               |                                                                                                            |          |
|------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------|----------|
| DEVICE TYPE            | Silverbox RADIO ASM-RECEIVER  |                                                                                                            |          |
| Temperature Range      | -30 °C ~ 85 °C                |                                                                                                            |          |
| OPERATING<br>FREQUENCY | Bluetooth                     | 2 402 MHz ~ 2 480 MHz                                                                                      |          |
|                        | WLAN 2.4 GHz                  | 2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))                                                                  |          |
|                        | 5 150 MHz ~<br>5 250 MHz Band | 5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))                                                          |          |
|                        |                               | 5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))                                                            |          |
|                        |                               | 5 210 MHz (802.11ac(VHT80))                                                                                |          |
|                        | 5 725 MHz ~<br>5 850 MHz Band | 5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))                                                          |          |
|                        |                               | 5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))                                                            |          |
|                        |                               | 5 775 MHz (802.11ac(VHT80))                                                                                |          |
| MODULATION<br>TYPE     | Bluetooth                     | GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps                                              |          |
|                        | WLAN 2.4 GHz                  | 802.11b:<br>DSSS Modulation(DBPSK/DQPSK/CCK)<br>802.11g/n(HT20):<br>OFDM Modulation(BPSK/QPSK/16QAM/64QAM) |          |
|                        | WLAN 5 GHz                    | 802.11a/n(HT20)/n(HT40)/ac(VHT80):<br>OFDM Modulation(BPSK/QPSK/16QAM/64QAM)                               |          |
| RF OUTPUT<br>POWER     | Bluetooth                     | 1 Mbps                                                                                                     | 0.75 dBm |
|                        |                               | 2 Mbps                                                                                                     | 2.78 dBm |
|                        |                               | 3 Mbps                                                                                                     | 2.82 dBm |
|                        | WLAN 2.4 GHz                  | 10.04 dBm(802.11b)                                                                                         |          |
|                        |                               | 10.49 dBm(802.11g)                                                                                         |          |
|                        |                               | 11.34 dBm(802.11n_HT20)                                                                                    |          |

|                                                       |                                           |                                                      |                                                                                                       |  |
|-------------------------------------------------------|-------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--|
| RF OUTPUT<br>POWER                                    | 5 150 MHz ~<br>5 250 MHz Band<br>(UNII I) | Internal Antenna                                     | 14.87 dBm(802.11a)<br>15.79 dBm(802.11n_HT20)<br>15.06 dBm(802.11n_HT40)<br>11.28 dBm(802.11ac_VHT80) |  |
|                                                       |                                           | External Antenna                                     | 8.16 dBm(802.11a)<br>9.13 dBm(802.11n_HT20)<br>8.03 dBm(802.11n_HT40)<br>4.37 dBm(802.11ac_VHT80)     |  |
|                                                       | 5 725 MHz ~<br>5 850 MHz Band<br>(UNII 3) | Internal Antenna                                     | 15.10 dBm(802.11a)<br>16.11 dBm(802.11n_HT20)<br>14.73 dBm(802.11n_HT40)<br>10.98 dBm(802.11ac_VHT80) |  |
|                                                       |                                           | External Antenna                                     | 8.20 dBm(802.11a)<br>9.16 dBm(802.11n_HT20)<br>7.77 dBm(802.11n_HT40)<br>4.08 dBm(802.11ac_VHT80)     |  |
| ANTENNA TYPE                                          | Bluetooth                                 | PCB Antenna                                          |                                                                                                       |  |
|                                                       | WLAN 2.4 GHz                              | PCB Antenna                                          |                                                                                                       |  |
|                                                       | WLAN 5 GHz                                | Internal Antenna                                     | PCB Antenna                                                                                           |  |
|                                                       |                                           | External Antenna                                     | PCB Antenna                                                                                           |  |
| ANTENNA GAIN                                          | Bluetooth                                 | 0.89 dBi                                             |                                                                                                       |  |
|                                                       | WLAN 2.4 GHz                              | 2.18 dBi                                             |                                                                                                       |  |
|                                                       | 5 150 MHz ~<br>5 250 MHz Band             | Internal Antenna                                     | 0.63 dBi                                                                                              |  |
|                                                       |                                           | External Antenna                                     | 2.37 dBi                                                                                              |  |
|                                                       | 5 725 MHz ~<br>5 850 MHz Band             | Internal Antenna                                     | -1.04 dBi                                                                                             |  |
|                                                       |                                           | External Antenna                                     | 3.61 dBi                                                                                              |  |
| List of each Osc. or crystal<br>Freq.(Freq. >= 1 MHz) |                                           | 20 MHz, 24 MHz, 25 MHz, 27 MHz, 40 MHz, 55.46667 MHz |                                                                                                       |  |

## 2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

## 3. EUT MODIFICATIONS

-. None

## 4. MAXIMUM PERMISSIBLE EXPOSURE

### 4.1 RF Exposure Calculation

According to the FCC rule §4.3. General SAR test exclusion guidance, the limit for 1-g and 10-g SAR test exclusion thresholds are  $\leq 3.0$  for 1-g SAR, and  $\leq 7.5$  for 10-g extremity SAR by the device operating 100 MHz to 6 GHz and test separation distances  $\leq 50$  mm

### 4.2 EUT Description

|                             |                                                                                                                                                              |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kind of EUT                 | Silverbox RADIO ASM-RECEIVER                                                                                                                                 |
| Device Category             | <input checked="" type="checkbox"/> Portable (< 20 cm separation)<br><input type="checkbox"/> Mobile (> 20 cm separation)<br><input type="checkbox"/> Others |
| Exposure Evaluation Applied | <input type="checkbox"/> MPE<br><input checked="" type="checkbox"/> SAR<br><input type="checkbox"/> N/A                                                      |

### 4.3 Test Result

#### 4.3.1 Test data for WLAN [Internal Antenna]

| Operating Freq.<br>Band<br>(MHz) | Frequency<br>(MHz) | Target Power<br>W/tolerance<br>(dBm) | Max tune up<br>power<br>(dBm) | Max tune up<br>power<br>(mW) | Separation<br>distance<br>(mm) | RF exposure |
|----------------------------------|--------------------|--------------------------------------|-------------------------------|------------------------------|--------------------------------|-------------|
| 5 150 ~ 5 250<br>802.11n_HT20    | 5 180              | 15.79 ± 0.5                          | 16.29                         | 42.56                        | 40                             | 2.422       |
| 5 725 ~ 5 850<br>802.11n_HT20    | 5 745              | 16.11 ± 0.5                          | 16.61                         | 45.81                        |                                | 2.745       |

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= [(45.81/40)] \times \sqrt{5.745} = 2.745$$

#### 4.3.2 Test data for WLAN [External Antenna]

| Operating Freq.<br>Band<br>(MHz) | Frequency<br>(MHz) | Target Power<br>W/tolerance<br>(dBm) | Max tune up<br>power<br>(dBm) | Max tune up<br>power<br>(mW) | Separation<br>distance<br>(mm) | RF exposure |
|----------------------------------|--------------------|--------------------------------------|-------------------------------|------------------------------|--------------------------------|-------------|
| 2 400 ~ 2 483.5<br>802.11n_HT20  | 2 437              | 11.34 ± 0.5                          | 11.84                         | 15.28                        | 40                             | 0.596       |
| 5 150 ~ 5 250<br>802.11n_HT20    | 5 180              | 9.13 ± 0.5                           | 9.63                          | 9.18                         |                                | 0.523       |
| 5 725 ~ 5 850<br>802.11n_HT20    | 5 785              | 9.16 ± 0.5                           | 9.66                          | 9.25                         |                                | 0.556       |

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= [(15.28/40)] \times \sqrt{2.437} = 0.596$$

#### 4.3.3 Test data for Bluetooth [Internal Antenna]

| Operating Freq.<br>Band<br>(MHz) | Frequency<br>(MHz) | Target Power<br>W/tolerance<br>(dBm) | Max tune up<br>power<br>(dBm) | Max tune up<br>power<br>(mW) | Separation<br>distance<br>(mm) | RF exposure |
|----------------------------------|--------------------|--------------------------------------|-------------------------------|------------------------------|--------------------------------|-------------|
| 2 400 ~ 2 483.5<br>EDR [3 Mbps]  | 2 480              | 2.82 ± 0.5                           | 3.32                          | 2.15                         | 40                             | 0.085       |

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= [(2.15/40)] \times \sqrt{2.480} = 0.085$$

#### 4.4 Test data for Intermodulation Transmit

| Operating Freq. Band (MHz) | Antenna port | Frequency (MHz) | Target Power W/tolerance (dBm) | Max tune up power (dBm) | Max tune up power (mW) | Separation distance (mm) | RF exposure | SUM RF exposure |
|----------------------------|--------------|-----------------|--------------------------------|-------------------------|------------------------|--------------------------|-------------|-----------------|
| Bluetooth + WLAN 2 G       | Antenna 0    | 2 480           | 2.82 ± 0.5                     | 3.32                    | 2.15                   | 40                       | 0.011       | 0.091           |
|                            | Antenna 1    | 2 437           | 11.34 ± 0.5                    | 11.84                   | 15.28                  |                          | 0.080       |                 |
| Bluetooth + WLAN 5 G       | Antenna 0    | 2 480           | 2.82 ± 0.5                     | 3.32                    | 2.15                   |                          | 0.011       | 0.085           |
|                            | Antenna 1    | 5 785           | 9.16 ± 0.5                     | 9.66                    | 9.25                   |                          | 0.074       |                 |
| WLAN 2 G + WLAN 5 G        | Antenna 0    | 5 745           | 16.11 ± 0.5                    | 16.61                   | 45.81                  |                          | 0.366       | 0.446           |
|                            | Antenna 1    | 2 437           | 11.34 ± 0.5                    | 11.84                   | 15.28                  |                          | 0.080       |                 |

According to the procedure, KDB 447498 D01, 4.3.2 b) is

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \times [\sqrt{f(\text{GHz})/x}]$$

Where  $x = 7.5$  for 1-g SAR and  $x = 18.75$  for 10-g SAR.

Antenna 0 + Antenna 1 < 1.6