

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.



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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 AUTHORIZATION REQUESTED	Certification
Modifications on the Equipment to 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 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 ~ 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 ~ 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 TYPE	Bluetooth	GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK)	
		802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)		
RF OUTPUT 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 POWER	5 150 MHz ~ 5 250 MHz Band (UNII 1)	Internal Antenna	14.87 dBm(802.11a) 15.79 dBm(802.11n_HT20) 15.06 dBm(802.11n_HT40) 11.28 dBm(802.11ac_VHT80)
		External Antenna	8.16 dBm(802.11a) 9.13 dBm(802.11n_HT20) 8.03 dBm(802.11n_HT40) 4.37 dBm(802.11ac_VHT80)
	5 725 MHz ~ 5 850 MHz Band (UNII 3)	Internal Antenna	15.10 dBm(802.11a) 16.11 dBm(802.11n_HT20) 14.73 dBm(802.11n_HT40) 10.98 dBm(802.11ac_VHT80)
		External Antenna	8.20 dBm(802.11a) 9.16 dBm(802.11n_HT20) 7.77 dBm(802.11n_HT40) 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 ~ 5 250 MHz Band	Internal Antenna	0.63 dBi
		External Antenna	2.37 dBi
	5 725 MHz ~ 5 850 MHz Band	Internal Antenna	-1.04 dBi
		External Antenna	3.61 dBi
List of each Osc. or crystal 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 ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR by the device operating 100 MHz to 6 GHz and test separation distances ≤ 50 mm

4.2 EUT Description

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

4.3 Test Result

4.3.1 Test data for WLAN [Internal Antenna]

Operating Freq. Band (MHz)	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
5 150 ~ 5 250 802.11n_HT20	5 180	15.79 ± 0.5	16.29	42.56	40	2.422
5 725 ~ 5 850 802.11n_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. Band (MHz)	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
2 400 ~ 2 483.5 802.11n_HT20	2 437	11.34 ± 0.5	11.84	15.28	40	0.596
5 150 ~ 5 250 802.11n_HT20	5 180	9.13 ± 0.5	9.63	9.18		0.523
5 725 ~ 5 850 802.11n_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. Band (MHz)	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune up power (dBm)	Max tune up power (mW)	Separation distance (mm)	RF exposure
2 400 ~ 2 483.5 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