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TEST REPORT

FCC SAR Exclusion Report for Silverbox RADIO ASM-RECEIVER

Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-SR-2307-FC008

DATE OF ISSUE
July 27, 2023

Technical Manager
Yun Jeang Heo (signature)

Accredited by KOLAS, Republic of KOREA

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TEST REPORT

FCC Test for IL7SF

REPORT NO.
HCT-SR-2307-FC008

DATE OF ISSUE
July 27, 2023

Applicant	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 17709, Republic of Korea
EUT Type Model Name	Silverbox RADIO ASM-RECEIVER IL7SF
FCC ID	BEJIL7SF3
Maximum Output Power	BT : 2.0 dBm, 2.4GHz : 20.0dBm, 5GHz UNII1 : 11.0dBm, 5GHz UNII3 : 22.0dBm
Modulation type	CCK/DSSS/OFDM/GFSK
FCC Classification	Digital Transmission System(DTS), Unlicensed National Information Infrastructure((NII), FCC Part 15 Spread Spectrum Transmitter
FCC Rule Part(s)	47CFR §2.1093

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	July 27, 2023	Initial Release

Engineering Statement:
The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 AND KOLAS (Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

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1. EUT DESCRIPTION

Model Name		IL7SF
EUT Type		Silverbox RADIO ASM-RECEIVER
Power Supply		DC 12.0 V
Frequency Range	2.4 GHz WiFi	2 412 ㎒ – 2 462 ㎒
	Bluetooth 4.2	2 402 ㎒ – 2 480 ㎒
	5GHz Wifi	UNII1(5180~5240 ㎒) , UNII3(5745~ 5825 ㎒)
Max. RF Output Power	2.4 GHz WiFi	20.0 dBm (100 mW)
	Bluetooth 4.2	2.0 dBm (1.58 mW)
	5 GHz WiFi	UNII 1 : 11.0dBm(12.59 mW) , UNII3 : 22.0dBm(158.49 mW)
Modulation Type	2.4 GHz WiFi	CCK/DSSS: 802.11b OFDM: 802.11g, 802.11n(HT20)
	Bluetooth 4.2	GFSK(Normal), π/4DQPSK and 8DPSK(EDR)
	5 GHz WiFi	OFDM: 802.11a, 802.11n, 802.11n40, 802.11ac20, 802.11ac40, 802.11ac80
Number of Channels	2.4 GHz WiFi	11 Channels
	Bluetooth 4.2	79 Channels, Minimum 20 Channels (AFH)
Antenna Specification	2.4 GHz WiFi	External Antenna: Max Gain: 1.20 dBi
	Bluetooth 4.2	Internal Antenna: Antenna Peak Gain : 4.80 dBi
	5 GHz WiFi	Internal Antenna: Max Gain: 5.95 dBi (UNII 1) / 4.79 dBi (UNII 3)
EUT serial numbers		Conduction : 210D83900

2. TEST METHODOLOGY

2.1 FCC

Body SAR Test Exclusions Applied _ Bluetooth 4.2, 5GHz WiFi
Since this product is a car audio navigation, it is used by most users in the Body. In addition, The antennas must be installed at all times a distance minimum of at least 80.8mm Between antenna and any individual. an exception evaluation is applied at a distance of 80 ㎜ from the Body SAR.

According to the FCC KDB 447498 D01 v06 section 4.3.1 b), for 100 ㎒ to 6 ㎓ and test separation distances ≥ 50 ㎜, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

b) For 100 ㎒ to 6 ㎓ and test separation distances ≥ 50 ㎜, the 1-g and 10-g SAR test exclusion thresholds are determined by the following(also illustrated in appendix B):
[(Power allowed at numeric threshold for 50mm in step a) + ((Test separation distance -50mm)*10)]mW, for >1500MHz and ≤ 6GHz

Appendix B

***SAR Test Exclusion Thresholds* for 100 MHz – 6 GHz and > 50 mm**

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
150	387	397	407	417	427	437	447	457	467	477	487	497	507	517	527	
300	274	294	314	334	354	374	394	414	434	454	474	494	514	534	554	
450	224	254	284	314	344	374	404	434	464	494	524	554	584	614	644	
835	164	220	275	331	387	442	498	554	609	665	721	776	832	888	943	
900	158	218	278	338	398	458	518	578	638	698	758	818	878	938	998	
1500	122	222	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	mW
1900	109	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	
2450	96	196	296	396	496	596	696	796	896	996	1096	1196	1296	1396	1496	
3600	79	179	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479	
5200	66	166	266	366	466	566	666	766	866	966	1066	1166	1266	1366	1466	
5400	65	165	265	365	465	565	665	765	865	965	1065	1165	1265	1365	1465	
5800	62	162	262	362	462	562	662	762	862	962	1062	1162	1262	1362	1462	

Calculation Result:

Bluetooth 4.2
Tx frequency range: 2 402 ㎒ ~ 2 480 ㎒
Body SAR Consideration Min. test separation distance: 80 ㎜
Maximum Output Power: 2 dBm (1.58 ㎽)
The Highest RF channel frequency: 2 480 ㎒

5GHz WiFi UNII 1
Tx frequency range: 5 180 ㎒ ~ 5 240 ㎒
Body SAR Consideration Min. test separation distance: 80 ㎜
Maximum Output Power: 11 dBm (12.59 ㎽)
The Highest RF channel frequency: 5 240 ㎒

5GHz WiFi UNII 3
Tx frequency range: 5 745 ㎒ ~ 5 825 ㎒
Body SAR Consideration Min. test separation distance: 80 ㎜
Maximum Output Power: 22 dBm (158.49 ㎽)
The Highest RF channel frequency: 5 825 ㎒

For Body SAR Exclusion

Mode	Frequency [㎒]	Maximum Allowed Power [㎽]	Separation Distance [㎜]	SAR Test Exclusion Thresholds for >50mm [㎽]	SAR Test Exclusion
Bluetooth 4.2	2 480	1.58	80	396	Yes
5GHz UNII1 WI-FI	5240	10	80	366	Yes
5GHz UNII3 WI-FI	5825	158.49	80	362	Yes

Based on the maximum output power of Bluetooth, 5GHz WI-FI and antenna to use separation distance, Bluetooth Body SAR were not required.

SAR Summation Scenario

No.	Capable Transmit Configuration	Body
1	Internal 5 GHz WI-FI Ant + Internal 2.4GHz Bluetooth	Yes
2	Internal 5 GHz WI-FI Ant + External 2.4GHz WI-FI Ant	Yes
3	Internal 2.4GHz Bluetooth + External 2.4GHz WI-FI Ant	Yes

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB 447498 D01v06

The estimate SAR values are calculated on scenario no.1.
0.4 W/Kg (Internal 5 GHz WI-FI Ant) + 0.4 W/Kg (Internal 2.4GHz Bluetooth) < 1.6 W/Kg

The simultaneous transmission RF Exposure should be addressed as mixed mobile and portable according to the procedure in KDB 447498 D01v06 section 7.2:

Antennas that qualify for standalone SAR test exclusion must apply the estimated standalone

SAR to determine simultaneous transmission test exclusion. a) The [∑ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [∑ of MPE ratios] is ≤ 1.0.

External Ant 2.4GHz WI-FI MPE Result is 0.04090 mW/cm^2

1. [0.25 (Internal Ant 5GHz WLAN Estimated SAR Result]] + [0.041(External Ant 2.4GHz WLAN MPE Result)] is ≤ 1.0.
2. [0.25 (Internal Ant 2.4GHz Bluetooth Estimated SAR Result)] + [0.041(External Ant 2.4GHz WLAN MPE Result)] is ≤ 1.0.