



RF - TEST REPORT

- Human Exposure -

Type / Model Name : ZLX G2-Amplifier-Module

Product Description : Amplifier module for powered speaker

Applicant : Bosch Security Systems, LLC

Address : 130 Perinton Parkway

Fairport; NY 14450, USA

Manufacturer : Bosch Security Systems, LLC

Address : 130 Perinton Parkway

Fairport; NY 14450, USA

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : **80168519-05 Rev_1**

01. December 2023

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

FCC-ID: ESV-ZLXG2 IC-ID: 1249A-ZLXG2

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ATTACHMENT A as separate supplement

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310 Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091 Radiofrequency radiation exposure evaluation: **mobile devices**.

KDB 447498 D01 RF Exposure procedures and equipment authorisation policies for mobile and portable devices, April 20, 2021.

ANSI C95.1: 2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

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2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.1 General remarks

None.

2.2 Photo documentation

Detailed photos of EUT see ATTACHMENT A.

Detailed photos of Test Setup see ATTACHMENT B.

2.3 Equipment type, category

Bluetooth & BLE Device

2.4 Short description of the equipment under test (EUT)

The EUT is an amplifier module for powered speaker that outputs the amplified audio signal on the built-in loudspeaker.

The speaker can be operated on a pole or standing on the ground.

Number of tested samples:	1
Serial number:	D-Sample #1
Firmware version:	Host: V.1.0.0 BT:V1.0.1

2.5 Variants of the EUT

The ZLX-G2-Amplifier-Module is used in the ZLX G2: ZLX-8P-G2, ZLX-8P-G2-EU, ZLX-8P-G2-US, ZLX-12P-G2, ZLX-12P-G2-EU, ZLX-12P-G2-US, ZLX-15P-G2, ZLX-15P-G2-EU, ZLX-15P-G2-US powered speakers.

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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2.6 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan Bluetooth Classic:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2429	54	2456
1	2403	28	2430	55	2457
2	2404	29	2431	56	2458
3	2405	30	2432	57	2459
4	2406	31	2433	58	2460
5	2407	32	2434	59	2461
6	2408	33	2435	60	2462
7	2409	34	2436	61	2463
8	2410	35	2437	62	2464
9	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

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Channel plan BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	18	2442
0	2404	19	2444
1	2406	20	2446
2	2408	21	2448
3	2410	22	2450
4	2412	23	2452
5	2414	24	2454
6	2416	25	2456
7	2418	26	2458
8	2420	27	2460
9	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	33	2472
14	2434	34	2474
15	2436	35	2476
16	2438	36	2478
17	2440	39	2480

2.7 Transmit operating modes

The EUT use DSSS or OFDM modulation and may operate under operating mode 2 and provide following data rates with auto-fall-back:

- 802.11b mode	11, 5.5, 2, 1 Mbps	(Mbps = megabits per second)
- 802.11g mode	54, 48, 36, 24, 18, 12, 9, 6 Mbps	(Mbps = megabits per second)

2.8 Antennas

The EUT has only an internal antenna, no temporary connector and no external antenna to be connected.

Type	Model	Frequency Range	Gain
Internal FPC antenna	PulseLARSEN W3921	2400-2500 MHz	+1 dBi

2.9 Power supply system utilised

Power supply voltage, V_{nom} : 120 V, 60 Hz

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3 TEST RESULT SUMMARY

Operating in the 2400 MHz – 2483.5 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
KDB 447498, 7.1	RSS 102, 2.5.2	MPE	passed
KDB 447498, 4.3.1	RSS 102, 2.5.1	SAR exclusion consideration	not applicable ¹⁾
KDB 447498, 7.2	RSS102, 3.2	Co-location, Co-transmission	not applicable ²⁾

The mentioned RSS Rule Parts in the above table are related to:
RSS 102, Issue 5, March 2015

- 1) Test not applicable, Human Body distance to EUT is typically $r > 20$ cm.
- 2) Test not applicable, BLE and BT can not send simultaneously.

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80168519-06	0	06 November 2023	Initial test report
80168519-06	1	28 November 2023	Updated MPE calculations for BT

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfills the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 19 September 2023

Testing concluded on : 28 November 2023

Checked by:

 Jürgen Pessinger
2023.12.01 14:23:30
+01'00'

Jürgen Pessinger
Radio Team

Tested by:

 Lukas Scheuermann
2023.12.01 12:34:13
+01'00'

Lukas Scheuermann
Radio Team

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4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

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5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

5.1.1 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.1.2 Description of Determination

The maximum rated output power conducted included the tune up tolerance is used to calculate the EIRP. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, can be calculated the MPE in a defined distance away from the product.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20$ cm)

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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5.1.3 Determination of MPE according FCC

BLE							
Channel	Cond. Power	Ant. Gain	Tune-up Tolerance	P _d	Limit	Margin	Exposure ratio
No.	dBm	dBi	dB	mW/cm ²	mW/cm ²	mW/cm ²	%
37	2.0	1.0	2.0	0.0010	1.0	-0.9990	0.10
17	2.1	1.0	2.0	0.0010	1.0	-0.9990	0.10
39	2.3	1.0	2.0	0.0011	1.0	-0.9989	0.11

BT							
Channel	Cond. Power	Ant. Gain	Tune-up Tolerance	P _d	Limit	Margin	Exposure ratio
No.	dBm	dBi	dB	(mW/cm ²)	(mW/cm ²)	(mW/cm ²)	(%)
0	8.1	1.0	2.0	0.0022	1.0	-0.9978	0.22
38	8.7	1.0	2.0	0.0023	1.0	-0.9977	0.23
78	8.9	1.0	2.0	0.0024	1.0	-0.9976	0.24

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	100	30
1.34 – 30	824/f	2.19/f	180/f ²	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	f/1500	30
1500-100000	---	---	1.0	30

 f = Frequency in MHz

The requirements are **FULFILLED**.

Remarks: All power values are according to CSA Test Reports 80168519-03 & -04.

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5.1.4 Determination of MPE according ISED

BLE								
Frequency	Cond. Power	Ant. Gain	Tune-up Tolerance	EIRP incl. Tune-up	Factor	$f^{0.6834}$	Limit	Margin
MHz	dBm	dBi	dB	mW		W	W	W
2402	2.0	1.0	2.0	3.16	0.0131	204.307	2.676	-2.673
2440	2.1	1.0	2.0	3.24	0.0131	206.511	2.705	-2.702
2480	2.3	1.0	2.0	3.39	0.0131	208.818	2.736	-2.732

BT								
Frequency	Cond. Power	Ant. Gain	Tune-up Tolerance	EIRP incl. Tune-up	Factor	$f^{0.6834}$	Limit	Margin
MHz	dBm	dBi	dB	mW		W	W	W
2402	8.1	1.0	2.0	12.88	0.0131	204.307	2.676	-2.664
2440	8.7	1.0	2.0	14.79	0.0131	206.511	2.705	-2.690
2480	8.9	1.0	2.0	15.49	0.0131	208.818	2.736	-2.720

Exemption limits for routine Evaluation – RF exposure evaluation according RSS102, 2.5.2:

At or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

At or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance)

The requirements are **FULFILLED**.

Remarks: All max. power values are according to CSA Test Reports 80168519-03 & -04.