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RF Exposure Evaluation Report

Report No. : CQASZ20190700541E-02
Applicant: ZAGG Inc.
Address of Applicant: 910 West Legacy Center Way, Suite 500 Midvale, Utah 84047, USA
Equipment Under Test (EUT):
Product: Braven BRV-XXL/2 Bluetooth Speaker
Model No.: BBRVXLB4Z39
Brand Name: BRAVEN
FCC ID: QTG-BAMDBXXL2
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2019-07-02
Date of Test: 2019-07-08 to 2019-09-12
Date of Issue: 2019-09-12
Test Result : **PASS***

Tested By: Tom Chen.
(Tom Chen)

Reviewed By: Sheek, Luo
(Sheek Luo)

Approved By: Jack Ai
(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190700541E-02	Rev.01	Initial report	2019-09-12

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3 General Information

3.1 Client Information


Applicant:	ZAGG Inc.
Address of Applicant:	910 West Legacy Center Way, Suite 500 Midvale, Utah 84047, USA
Manufacturer:	ZAGG Inc.
Address of Manufacturer:	910 West Legacy Center Way, Suite 500 Midvale, Utah 84047, USA

3.2 General Description of EUT

Product Name:	Braven BRV-XXL/2 Bluetooth Speaker		
Model No.:	BBRVXLB4Z39		
Trade Mark:	BRAVEN		
Hardware Version:	VA.0		
Software Version:	V1.3		
Operation Frequency:	2402MHz~2480MHz		
Bluetooth Version:	V4.2		
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)		
Modulation Type:	GFSK, $\pi/4$ DQPSK, 8DPSK		
Transfer Rate:	1Mbps/2Mbps/3Mbps		
Number of Channel:	79		
Hopping Channel Type:	Adaptive Frequency Hopping systems		
Product Type:	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location		
Test Software of EUT:	ISRT V2.1.32.5821 (manufacturer declare)		
Antenna Type:	PCB antenna		
Antenna Gain:	1.927dBi		
AC cable:	175cm(Unshielded)		
DC cable:	140cm(Unshielded)		
EUT Ratings:	Input: 22.0V $\overline{\text{---}}$ 4.0A, USB output: 5V $\overline{\text{---}}$ 1A		
Ratings---Input:	lithium battery: 11.1V, 5200mAh, 57.72Wh, Charge by adapter		
	Adapter:	Model: DYS902-220400W	
		Input: AC100~240V 50/60Hz Output: 22.0V $\overline{\text{---}}$ 4.0A	

Battery and power supply information:

Object / part No.	Factory	Model	Technical data
Li-ion Polymer Battery	GUANGDONG POW-TECH NEW POWER CO., LTD.	ICR18650	11.1V, 5200mAh, 57.72Wh
Cell of battery	GUANGDONG POW-TECH NEW POWER CO., LTD.	ICR18650	3.7V, 2600mAh, 9.62Wh
External power supply	DONGGUAN DONGSONG	DYS902-220400W	Input: AC100~240V 50/60Hz

	ELECTRONIC CO., LTD.		Output: 22.0V  4.0A
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The battery pack has two cells connected in parallel, and then three sets of identical parallel battery packs are connected in series. The Li-ion Polymer Battery Discharge Cut-off Voltage is 9.0V. The Cell of battery Max Charge voltage is $4.2V \pm 0.05V$, and overcharge protection voltage is $4.35 \pm 0.05V$.

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following(also illustrated in Appendix A):

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	<i>SAR Test Exclusion Threshold (mW)</i>
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	
MHz	30	35	40	45	50	
150	232	271	310	349	387	<i>SAR Test Exclusion Threshold (mW)</i>
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds in step b) below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following (also illustrated in Appendix B):

- 1) $\{[Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ step\ a)] + [(test\ separation\ distance - 50\ mm) \cdot (f(MHz)/150)]\}$ mW, for 100 MHz to 1500 MHz
- 2) $\{[Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ step\ a)] + [(test\ separation\ distance - 50\ mm) \cdot 10]\}$ mW, for > 1500 MHz and ≤ 6 GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

- 1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by $[1 + \log(100/f(MHz))]$
- 2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by $\frac{1}{2}$
- 3) SAR measurement procedures are not established below 100 MHz.

When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any SAR test results below 100 MHz to be acceptable.

4.1.3 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.2 1.1.3 EUT RF Exposure Evaluation

Measurement Data

1) For BT classic

Test mode : GFSK					
Channel	Maximum Peak Conducted Output Power (dBm)	Antenna gain (dBi)	E.i.r.p. calculation value		Limit (mW)
			(dBm)	(mW)	
Lowest (2402MHz)	13.800	1.927	15.727	37.385	<57mW
Middle (2441MHz)	13.200	1.927	15.127	32.561	<57mW
Highest (2480MHz)	13.130	1.927	15.057	32.041	<57mW
Conclusion: E.i.r.p. calculation value <limit, SAR is exempted.					

Test mode : $\pi/4$ DQPSK					
Channel	Maximum Peak Conducted Output Power (dBm)	Antenna gain (dBi)	E.i.r.p. calculation value		Limit (mW)
			(dBm)	(mW)	
Lowest (2402MHz)	13.710	1.927	15.637	36.618	<57mW
Middle (2441MHz)	13.210	1.927	15.137	32.636	<57mW
Highest (2480MHz)	13.200	1.927	15.127	32.561	<57mW
Conclusion: E.i.r.p. calculation value <limit, SAR is exempted.					

Test mode : 8DPSK					
Channel	Maximum Peak Conducted Output Power (dBm)	Antenna gain (dBi)	E.i.r.p. calculation value		Limit (mW)
			(dBm)	(mW)	
Lowest (2402MHz)	13.640	1.927	15.567	36.033	<57mW
Middle (2441MHz)	13.280	1.927	15.207	33.167	<57mW
Highest (2480MHz)	13.230	1.927	15.157	32.787	<57mW
Conclusion: E.i.r.p. calculation value < limit, SAR is exempted.					

Note: 1) Refer to report No. CQASZ20190700541E-01 for EUT test Max Conducted Peak Output Power value.
2) EIRP= Max Conducted Peak Output Power + Antenna gain

Multiple Transmitter Evaluation



Mode	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
Main Antenna	NO	NO	NO	NO	YES	NO

As shown in the above figure, the distance from the top of the antenna is 3cm, 4cm from the right side, 47cm from the left side, and 10cm from the front and back, so only select the top of the shortest distance for RF Exposure Evaluation.