RF EXPOSURE
TEST REPORT

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ACCREDITED
CERT #3657.02

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Manufacturer:	Jacknife Gamer Inc
Address:	5007 Irmin Street, Burnaby, BC, V5J 1Y6, Canada
Equipment Tested:	**Bluetooth Gamepad**
Model Number(s):	JKG2022A
FCC ID:	2A8RW-JKGPAD
ISED ID:	29448-JKGPAD
FVIN:	20220926A

REVISION HISTORY

Date	Report Number	Details	Author's Initials
October 4, 2022	E11289-2202_Jacknife_RF Expo_FCC_IC_Rev_1.0	1.0	Initial Release
All previous versions of this report have been superseded by the latest dated revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.			

REPORT AUTHORIZATION

The data documented in this report is for the test equipment and sample provided by Jacknife. Tests were conducted on the sample equipment for the purpose of demonstrating compliance with applicable test standard mentioned above as agreed upon by Jacknife as per Quote 22RH09121.
Jacknife is responsible for the tested product configuration, continued product compliance, and for the appropriate auditing of subsequent products as required. This report may comprise partial list of tests that are required for FCC & IC Declaration of Conformity and can only be produced by the manufacturer.

This is to certify that the following report is true and correct to the best of our knowledge.

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EMC Laboratory Location	FCC Designation (3m SAC)	IC Registration (3m SAC)	A2LA Certificate
Burnaby, BC, Canada	CA9543	9543A	3657.02

EMC Facility Burnaby BC, Canada

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1 EXECUTIVE SUMMARY

1.1 Applicable Standards and Results

No.	Test	Applicable Standard	Result
1	RF Exposure Evaluation	FCC 47 CFR §2.1093 (e) & 1.1310 (d) KDB 447498 D01 v06 (4.2.3 & 4.3) RSS-102 (2.5.1)	Complies

A) FCC - KDB 447498

4.2.3. Extremity exposure conditions: Devices that are designed or intended for use on extremities, or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation.26 When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Test Exclusion Thresholds in 4.3 should be applied to determine SAR test requirements.

4.3. General SAR test exclusion guidance: (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: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 *for* 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,30 where f(GHz) is the RF channel transmit frequency in 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) ISED - RSS-102 Section:

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is less than or equal to 20 cm, **except** when the device operates as follows:
from 3 kHz up to 1 GHz inclusively, and with output power (i.e., the higher of the conducted or equivalent isotropic ally radiated power (e.i.r.p.) source-based, time-averaged output power) that is less than or equal values listed in the table below.

Table 1: SAR evaluation – Exception limits for routine evaluation based on frequency and separation distance 4, 5

Exception Limits (mW)					
Frequency (MHz)	**At separation distance of ≤5 mm**	**At separation distance of 10 mm**	**At separation distance of 15 mm**	**At separation distance of 20 mm**	**At separation distance of 25 mm**
≤300	71	101	132	162	193
450	52	70	88	106	123
835	17	30	42	55	67
1900	7	10	18	34	60
2450	4	7	15	30	52
3500	2	6	16	32	55
5800	1	6	15	27	41
Exception Limits (mW)					
Frequency (MHz)	**At separation distance of 30 mm**	**At separation distance of 35 mm**	**At separation distance of 40 mm**	**At separation distance of 45 mm**	**At separation distance of ≥50 mm**
300	223	254	284	315	345
450	141	159	177	195	213
835	80	92	105	117	130
1900	99	153	225	316	431
2450	83	123	173	235	309
3500	86	124	170	225	290
5800	56	71	85	97	106

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants' device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ f0.5	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10^{-4} $f^{0.5}$	6.67 x 10^{-5} f	616000/$f^{1.2}$

Note: f is frequency in MHz.

* Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR)

1.2 Summary of Results

The following testing was performed pursuant to FCC Title 47 Part 15 and Industry Canada ICES-003 to demonstrate the testimony to "FCC, IC, & CE" mark Electromagnetic Compatibility testing for the product.

No.	Test	Applicable Standard	Description	Result
13	RF Exposure Evaluation	FCC 47 CFR 2.1093 (e) FCC 47 CFR 1.1310 (d) RSS-102 Issue 2 (2.5.1)	RF exposure evaluation	Complies

Table 1: Applicable test standards and descriptions

Note: The gain of the antenna(s) is provided by the client to measure or calculate test results and is not independently measured by QAI.

1.3 Test Equipment List

The tables below contain all the equipment used by QAI Laboratories in conducting all tests on the Equipment Under Test (EUT) as per Section 1.

Measurement Software List

Sl. No.	Manufacturer	Model	Version	Description
1	Rhode & Schwarz	EMC 32	10.35.10	Emissions Test Software
2	TESEQ	WIN 3000	1.2.0	Surge, EFT & Voltage Dips Immunity Test Program
3	Thurlby Thandar Instruments	HA-PC Link Version	2.02	Harmonics and Flicker Test Program
4	VI Automation	Via EMC Immunity Executive	1.0.308	Radiated and Conducted Immunity Test Program

Emissions Test Equipment

Note: Equipment listed above have 3 years calibration interval.

Measurement Software List Emissions Test Equipment

Sl. NO.	Manufacturer	Model	Description	Serial No.	S/W Version	Calibration Due Date
1	AH Systems	PAM118	Amplifier (10KHz-18GHz)	189	N/A	Conditional Use
2	EMCO	3825/2	LISN (150kHz-30MHz)	9002-1601	N/A	2023-Oct-01
3	ETS Lindgren	2165	Turntable	00043677	N/A	N/A
4	ETS Lindgren	2125	Mast	00077487	N/A	N/A
5	ETS Lindgren	S201	5-meter Semi-Anechoic Chamber	1030	N/A	N/A
6	Hewlett Packard	8449B	Preamplifier (1-26 GHz)	2933A00198	N/A	2025-Feb-15
7	Rohde & Schwarz	ESU40	EMI Receiver	100011	EMC32 v10.35.10/ FV 4.73 SP4	2023-Jul-05
8	Sunol Sciences	DRH-118	Horn Antenna, 1.0-18 GHz	A050905	N/A	2023-07-28
9	Sunol Sciences	SM46C	Turntable	051204-2	N/A	N/A
10	Sunol Sciences	TWR95	Mast	TREML0001	N/A	N/A
11	Sunol Sciences	JB3	Biconilog Antenna 30MHz – 3GHz	A042004	N/A	2023-Jul-30
14	Rigol	RSA5065-TG	Spectrum Analyser	39775	N/A	4/11/2023

Note: Equipment listed above have 3 years calibration interval.

2 GENERAL INFORMATION

2.1 Product Description

The information provided in this section is for the Equipment Under Test (EUT) and the corresponding Auxiliary Equipment needed to perform the tests as a complete system.

Figure 1: EUT

Equipment Under Test (EUT)

Equipment	Bluetooth Gamepad
Description	Bluetooth mini gamepad for mobile phones
Manufacturer	Jacknife Gamer Inc.
Model No.	JKG2022A
Serial No.	2022A-001
Clock frequencies tuned upon within the EUT: Highest frequency generated within the EUT:	2400MHz to 2483.5MHz 2480MHz

Equipment Under Test (EUT) – RF Information

Operating frequency	**2400MHz to 2483.5MHz**
Number of available channels/Transmitter	**Bluetooth BLE v5.0**
Modulation type	**Nrf52832**
Test Channels (L, M, H)	**xx MHz, xx MHz, xx MHz**
Data Rate	**1Mbits to 2 MBits**
Adaptive	**N/A**
Geo-location-capable	**N/A**
Number of antennas	**1**
Antenna type	**Trace**
Antenna gain	**+1.0**

Notes: None.

Equipment Under Test (EUT) – General Information

Tested as	Portable
Dimensions	6.4x2.9x2.7 cm
Declared operating temperature range:	-20 to 45 °C
Input power	0.9W
Grounded	No
Device use	Click or tap here to enter text.

Notes: None.

2.2 Environmental Conditions

The equipment under test was operated and tested under the following environmental conditions:

Parameter	Conditions
Location	Indoors
Temperature	23-24ºC
Relative Humidity	39.7 - 54.4%

2.3 Measurement Uncertainty

Parameter	Uncertainty
Radiated Emissions, 30MHz-1GHz	± 2.40 dB
Radiated Emissions, 1GHz-40GHz	± 2.48 dB
Radio Frequency	±1.5 x 10-5 MHz

Total RF Power Conducted	±1.36 dB
Spurious Emissions, Conducted	±1.36 dB
RF Power Density, Conducted	±1.36 dB
Temperature	±1ºC
Humidity	±5 %
DC and low frequency voltages	±3 %

2.4 Worst Test Case

Worst-case orientation was determined during the preliminary testing. The final radiated emissions were performed in the worst-case orientation.

2.5 Sample Calculations of Emissions Data

Radiated and conducted emissions were performed using EMC32 software developed by Rohde & Schwarz. Transducer factors such as antenna factors, cable losses and amplifier gains were stored in the test templates which are used to perform the emissions measurements. After the test is finished, data is generated from the EMC32 consisting of product details, emission plots and final data tables as shown below.

Frequency (MHz)	Q-Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Ant. Ht. (cm)	Pol	Turntable Position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
42.663900	33.0	1000.000	120.000	100.0	H	70.0	13.2	7.5	40.5

Table 2: Sample Quasi-Peak Correction Data - Radiated

Quasi-Peak reading shown in the table above is already corrected by the software using the correction factor shown in column "Corr." The correction factor listed under "Corr." table calculated as:

Corr.(dB) = Antenna factor + Cable loss

Or

Corr.(dB) = Antenna factor + Cable Loss - Amp gain (if pre-amplifier was used)

The final Quasi peak reading shown in the data is calculated by the software using following equation:

Corrected Quasi-Peak (dBµV/m) = Raw Quasi-Peak Reading + Antenna factor + Cable loss

To obtain the final Quasi-Peak or Average reading during power line conducted emissions, transducer factors are included in the final measurement as shown below.

Frequency (MHz)	Q-Peak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	44.3	1000.000	9.000	GND	0.6	21.7	66.0

Table 3: Sample Quasi-Peak Correction Data - Conducted Emissions

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150	27.2	1000.000	9.000	GND	0.6	28.8	56.0

Table 4: Sample Average Correction Data- Radiated Emissions

Quasi Peak or Average reading shown in above table is already corrected by the software using the correction factor shown in column "Corr." The correction factor listed under "Corr." table calculated as:

Corr.(dB) = Antenna factor + Cable loss

The final Quasi-peak or Average reading shown in the data is calculated by the software using following equation:

Corr. Quasi-Peak/Average Reading (dBµV) = Raw Quasi-Peak/Average Reading + Antenna factor + Cable loss

The allowable margin from the limits, as per the standards, were calculated for both radiated and conducted emissions:

Margin(dB) = Limit – Quasi-Peak or Average reading

3 DATA & TEST RESULTS

3.1 RF Peak Power Output

Date Performed: September 29, 2022

Test Standard: FCC CFR 47 Part 15.247 (b)(1)
IC RSS-247 Issue 2

Test Method: FCC KDB 558074 D01 DTS Measurement Guidance V04
Span = 1 MHz, RBW = 120 kHz, VBW = 300 kHz
Detector: Peak, Trace: Max Hold

Modifications: No modification was required to comply for this test.

Final Result: The EUT complies with the applicable standard.

Applicable Regulation:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Test Setup:

The EUT was tested outside the SAC via output conducted measurements per FCC KDB 558074 D01 DTS Measurement Guidance V04.

Measurement Data and Plots:

Carrier Frequency (MHz)	Raw Peak (dBm)	Correction Factor (dB)	Corrected Peak Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)	Results
2401	-30.96	20.90	-10.06	30	40.06	Complies
2441	-30.69	20.90	-9.79	30	39.79	Complies
2480	-30.44	20.90	-9.54	30	39.54	Complies

Table 5: RF Peak Power Output

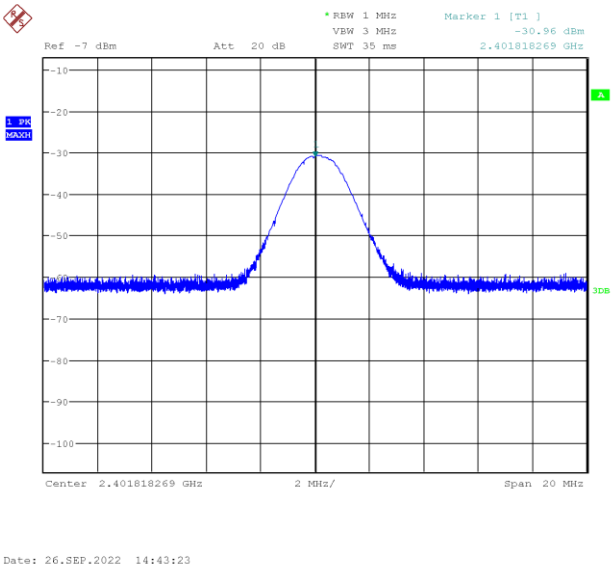

Figure 2: Peak Output Power - Lowest Frequency

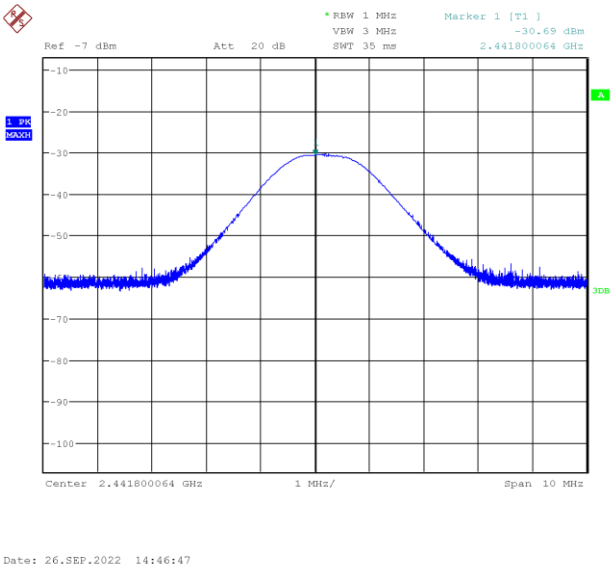

Figure 3: Peak Output Power - Middle Frequency

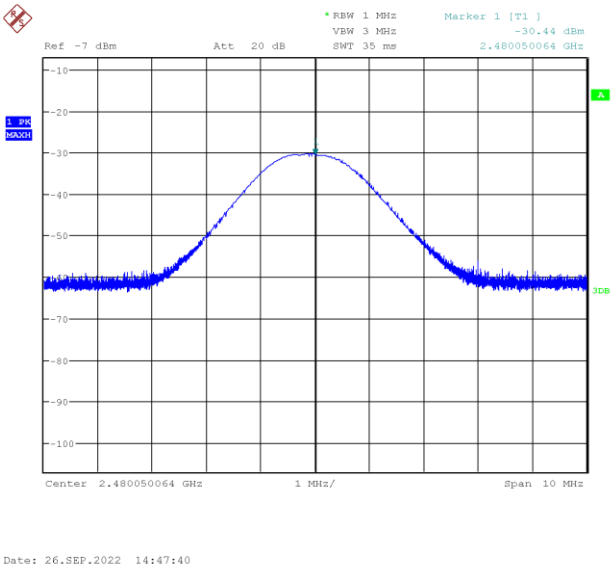

Figure 4: Peak Output Power - Highest Frequency

3.2 RF Exposure Evaluation

Date Performed: October 7, 2022

Test Standard: FCC 47 CFR §2.1093 (e) & 1.1310 (d)
KDB 447498 D01 v06 (4.2.3 & 4.3)
RSS-102 (2.5.1)

Test Method: ANSI C63.4-2014

Modifications: No modification was required to comply for this test.

Result: EUT complies with the applicable standard.

1) FCC Section:

Carrier Frequency MHz	RF Peak Output Power Conducted dBm	Peak Antenna Gain dBi	EIRP		Duty Cycle %	EIRP (AVG) mW	EIRP (AVG) dBm
			dBm	mW			
2401	-10.06	+1.0	-9.06	124.16	14	17.36	12.40
2441	-9.79	+1.0	-8.79	132.13	14	18.48	12.67
2480	-9.54	+1.0	-8.54	139.96	14	19.60	12.96

Table 6: FCC Data Calculation

Frequency (MHz)	Min. Separation (mm) (Note)	Distance (mm)	Result
2401	3.47	30	Exempt
2441	3.76	30	Exempt
2480	4.10	30	Exempt

Table 7: FCC Sar Exemption

Note: 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: [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, 30 where • f(GHz) is the RF channel transmit frequency in GHz . Minimum separation for hand held 10-g limit = (19.6 mW).(√2.48(GHz))/7.5 (Hand held)

Maximum Separation = 4.10 mm (worst Case)

Since this distance is greater than 3.9 mm this product is SAR exempt

2) ISED Section:

Carrier Frequency MHz	RF Peak Output Power Conducted dBm	Peak Antenna Gain dBi	EIRP		Duty Cycle %	EIRP (AVG) mW	EIRP (AVG) dBm
			dBm	mW			
2401	-10.06	+1.0	-9.06	124.16	14	17.36	12.40
2441	-9.79	+1.0	-8.79	132.13	14	18.48	12.67
2480	-9.54	+1.0	-8.54	139.96	14	19.60	12.96

Table 8: ISED Data Calculation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is less than or equal to 20 cm, **except** when the device operates as follows: from 3 kHz up to 1 GHz inclusively, and with output power (i.e., the higher of the conducted or equivalent isotropic ally radiated power (e.i.r.p.) source-based, time-averaged output power) that is less than or equal values listed in the table below.

Exception limits for routine evaluation based on frequency and separation distance

Exception Limits (mW)					
Frequency (MHz)	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
300	223	254	284	315	345
450	141	159	177	195	213
835	80	92	105	117	130
1900	99	153	225	316	431
2401	89mWx2.5=222.5 (note)	123	173	235	309
2450	83	123	173	235	309
3500	86	124	170	225	290
5800	56	71	85	97	106

* The multiplier factor of 2.5 is used for the 10-g limit for limb worn devices.

The values in the table above for the 1-g limit are multiplied by a factor of 5 for controlled use devices.

Frequency (MHz)	EIRP (AVG) mW	Max EIRP limit (mW)	Result
2401	17.36	222.2	Exempt
2441	18.48	211.4	Exempt
2480	19.60	208.5	Exempt

Table 9: ISED Sar Exemption

Appendix A: ABBREVIATIONS

Abbreviation	Definition
AC	Alternating Current
AM	Amplitude Modulation
CE	European Conformity
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
DC	Direct Current
EFT	Electrical Fast Transient
EMC	Electro Magnetic Compatibility
EMI	Electro Magnetic Interference
ESD	Electrostatic Discharge
EUT	Equipment Under Test
FCC	Federal Communications Commission
FVIN	Firmware Version Identification Number FVIN
IC	Industry Canada
ICES	Interference Causing Equipment Standard
IEC	International Electrotechnical Commission
LISN	Line Impedance Stabilizing Network
OATS	Open Area Test Site
RF	Radio Frequency
RMS	Root-Mean-Square
SAC	Semi-Anechoic Chamber

END OF REPORT