TEST REPORT

Application No.:	HKEM2311000868HS
Applicant:	Zwift, Inc.
Address of Applicant:	111 W. Ocean Blvd Suite 1800, Long Beach, CA 90802, USA
Equipment Under Test (EUT):	
EUT Name:	Zwift: Ride
Model No.:	Z005
FCC ID:	2A4DF-Z005
IC:	31677-Z005
HVIN:	Z005
Standard(s) :	47 CFR Part 1.1307 47 CFR Part 2.1093 KDB447498 D01 General RF Exposure Guidance v06 RSS102 Issue 5 March 2015
Date of Receipt:	2024-01-18
Date of Test:	2024-01-18 to 2024-01-25
Date of Issue:	2024-01-25
Test Result:	The submitted sample was found to comply with the test requirement

Law Man Kit
EMC Manager

Revision Record			
Revision No.	**Date**	**Report superseded**	**Remark**

Authorized for issue by:				
				
		Chan Chun Lok /Project Engineer		Date: 2024-01-25
				
		Law Man Kit /Reviewer		Date: 2024-01-25

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
RF Exposure	47 CFR Part 1.1307 47 CFR Part 2.1093 KDB447498D01	KDB447498D01	KDB447498D01	PASS
RF Exposure	RSS102 Issue 5	RSS-102 Section 2.5.1	RSS102 Issue 5	PASS

Declaration of EUT Family Grouping:
N/A

Abbreviation:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Battery Model: C0012A Output: DC 3.6 V
Test voltage:	DC 3.6 V
Cable:	Power Cable: 149 cm unshielded 2-wire USB cable
Antenna Gain:	5.3 dBi
Antenna Type:	PCB Antenna
Bluetooth Version:	V5.4 LE
Channel Separation:	2MHz
Modulation Type:	GFSK
Number of Channels:	40
Operation Frequency:	2402MHz to 2480MHz
Series No.:	A1
Firmware Version:	0.2.3
Hardware Version:	A.0

Frequency List:

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

The frequencies under test are bolded.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Modulation Configuration

RF software:	N/A			
Modulation	**Packet**	**Packet Type**	**Packet Size**	**Power**
GFSK	Default	Default	Default	Default
Remark: 1. Default value was set in test software as maximum output power setting.				

4.4 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **IAS Accreditation (Lab Code: TL-817)**

SGS Hong Kong Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS Hong Kong Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS Hong Kong Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Radio Spectrum Technical Requirement

5.1 RF Exposure

5.1.1 Test Requirement:

KDB447498 D01
Limit:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(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, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

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 is applied to determine SAR test exclusion

RSS-102

Limit:

All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.1 or 2.5.2 of RSS-102 Issue 5, March 2015. If the equipment under test (EUT) meets the requirements of sections 2.5.1 or 2.5.2, applicants are only required to submit a properly signed declaration of compliance.

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance

Frequency (MHz)	Exemption Limits (mW)				
	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 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	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 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

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 10-gram 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.

5.1.2 EUT RF Exposure Evaluation

FCC:

According to the formula. calculate the test exclusion thresholds:

BLE Right:
General RF Exposure = (2.754mW / 5 mm) x √2.402 GHz = 0.854 *(1)*

BLE Left:
General RF Exposure = (2.754mW / 5 mm) x √2.402 GHz = 0.854 *(2)*

SAR requirement:
S = 7.5 *(3)*

(1) < (3), (2) < (3)

The output powers of all single RF sources are less than their corresponding threshold.

Multiple RF sources evaluation:

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

∑ = 0.854/ 7.5 + 0.854/ 7.5 = 0.23

0.23 < 1

Thus, they are exempt from SAR testing.

Remark: 2.754 mW (4.4dBm) was derived from the worst conducted output power of -0.9dBm and the antenna gain of 5.3dBi from report HKEM231100086802.

ISED:

By using linear interpolation to determine the limit for the worse separation distance of ≤ 5 mm at 2402 MHz:

Limit = 7 + (2402 - 1900) x ((4 - 7) / (2450 - 1900)) = 4.26 mW

For extremity, the exemption limits for routine evaluation in table 1 are multiplied by a factor of 2.5:

4.26 mW * 2.5 = 10.65mW

The maximum average e.i.r.p of the BLE Right:

= 4.4 dBm

= 10^(4.4/10)

= 2.75 mW

The maximum average e.i.r.p of the BLE Left:

= 4.4 dBm

= 10^(4.4/10)

= 2.75 mW

The output power of all the single RF sources are less than the their corresponding threshold.

Multiple RF sources evaluation:

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

∑ = 2.75/ 10.65 + 2.75/ 10.65 = 0.52

0.52 < 1

Thus, they are exempt from SAR testing.

6 Photographs

6.1 EUT Constructional Details (EUT Photos)

Refer to the appendices external, internal and setup photos.

- End of the Report -