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RF Exposure Evaluation Report

Report No. :	CQASZ20190300204E-02
Applicant:	WHOOP INC
Address of Applicant:	1325 Boylston St, Suite 401, Boston, MA USA 02215
Manufacturer:	Shenzhen Fenda Technology Co., Ltd.
Address of Manufacturer:	Fenda Technology Park, Shiyan Road, Bao'an District, Shenzhen, Guangdong, China
Equipment Under Test (EUT):	
Product:	WHOOP Strap 3.0
Model No.:	WS30
Brand Name:	WHOOP, Inc.
FCC ID:	2AJ2X-WS30
IC:	22056-WS30
Standards:	47 CFR Part 1.1307 47 CFR Part 2.1093 KDB447498D01 General RF Exposure Guidance v06 RSS-102 Issue 5 March 2015
Date of Test:	2019-03-24 to 2019-04-26
Date of Issue:	2019-04-26
Test Result :	**PASS***

Tested By： (Daisy Qin)

Reviewed By: (Aaron Ma)

Approved By: (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
CQASZ20190300204E-02	Rev.01	Initial report	2019-04-01

2 Contents

3 General Information

3.1 Client Information

Applicant:	WHOOP INC
Address of Applicant:	1325 Boylston St, Suite 401, Boston, MA USA 02215
Manufacturer:	Shenzhen Fenda Technology Co., Ltd.
Address of Manufacturer:	Fenda Technology Park, Shiyan Road, Bao'an District, Shenzhen, Guangdong, China

3.2 General Description of EUT

Product Name:	WHOOP Strap 3.0
Model No.:	WS30
Trade Mark:	WHOOP, Inc.
Operation Frequency:	BLE: 2402MHz~2480MHz NFC: 13.56MHz
Bluetooth Version:	5.0
Modulation Type:	BLE: GFSK NFC: ASK
Transfer Rate:	BLE: 1Mbps, 2Mbps
Number of Channel:	BLE: 40 NFC: 1
Product Type:	☐ Mobile ☒ Portable ☐ Fix Location
Test Software of EUT:	TeraTerm (manufacturer declare)
Antenna Type:	BLE: Chip SMD NFC: Loop anntenna
Antenna Gain:	1.5dBi for BLE, 0dBi for NFC
EUT Power Supply:	lithium battery:DC3.8V

4 SAR Evaluation

4.1 FCC 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

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

4.1.3 EUT RF Exposure

Measurement Data

For BLE:

Test mode : GFSK_1Mbps						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	-0.15	-0.5±0.5	0	1.0	0.31	3.0
Middle (2440MHz)	-0.22	-0.5±0.5	0	1.0	0.31	
Highest (2480MHz)	-0.51	-0.5±0.5	0	1.0	0.31	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Test mode : GFSK_2Mbps						
Channel	Maximum Peak Conducted Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power		Calculated value	Exclusion threshold
			(dBm)	(mW)		
Lowest (2402MHz)	-0.13	-0.5±0.5	0	1.0	0.31	3.0
Middle (2440MHz)	-0.2	-0.5±0.5	0	1.0	0.31	
Highest (2480MHz)	-0.51	-0.5±0.5	0	1.0	0.31	
Conclusion: the calculated value ≤3.0, SAR is exempted.						

Remark: The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20190300204E-01

4.2 IC RF Exposure Compliance Requirement

4.2.1 Standard Requirement

According to RSS-102 Issue 5 March 2015

2.5.1 Exemption Limits for Routine Evaluation – SAR Evaluation

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.

4.2.2 Limits

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

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

4.2.3 EUT RF Exposure

1) For BLE

Measurement Data

Test mode : GFSK_1Mbps					
Channel	Maximum Peak Conducted Output Power (dBm)	Antenna gain (dBi)	E.i.r.p. calculation value		Limit (mW)
			(dBm)	(mW)	
Lowest (2402MHz)	-0.15	1.5	1.35	1.36	＜4.26mW
Middle (2440MHz)	-0.22	1.5	1.34	1.36	＜4.05mW
Highest (2480MHz)	-0.51	1.5	0.99	1.26	＜3.94mW
Conclusion: E.i.r.p. calculation value ＜limit, SAR is exempted.					

Test mode : GFSK_2Mbps					
Channel	Maximum Peak Conducted Output Power (dBm)	Antenna gain (dBi)	E.i.r.p. calculation value		Limit (mW)
			(dBm)	(mW)	
Lowest (2402MHz)	-0.13	1.5	1.37	1.37	＜4.26mW
Middle (2440MHz)	-0.2	1.5	1.30	1.35	＜4.05mW
Highest (2480MHz)	-0.51	1.5	0.99	1.26	＜3.94mW
Conclusion: E.i.r.p. calculation value ＜limit, SAR is exempted.					

Remark: 1) The Max Conducted Peak Output Power data refer to report Report No.: CQASZ20190300204E-01

2) EIRP= Max Conducted Peak Output Power + Antnna gain

For NFC:

eirp = pt x gt = $(E \times d)^2/30$

where:

pt = transmitter output power in watts,

gt = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, ---$10^{((dB\mu V/m)/20)}/10^6$,

d = measurement distance in meters (m)---3m,

So pt = $(E \times d)^2/30$ / gt

The worst case (refer to report CQASZ20190300204E-03) is below:

Frequency (MHz)	Level (dBμV/m)	Value
13.56	68.72	Peak

For 13.56MHz wireless:

Field strength = 68.72dBμV/m @3m

Ant. gain 0dBi; so Ant numeric gain=1.0

So pt={$[10^{(68.72/20)}/10^6 x3]^2/30$ /1.0}x1000mW =0.002mW

0.002mW< Limit: 71mW

So the SAR report is not required.

For BLE and NFC simultaneously:

Simultaneous transmission mode	The sum of the ratios	Result
BLE + NFC	1.36/4.05+0.002/71	0.336<1

So the SAR report is not required.