TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR23-SRF0068 Page (1) of (8)	eurofins | KCTL

1. Client

- Name : Golfzon. co., LTD.
- Address : GOLFZON TOWER SEOUL 10~11F, 13F~17F, 19F, 735, Yeongdong-daero, Gangnam, Seoul, Republic of Korea
- Date of Receipt : 2022-07-21

2. Use of Report : Certification

3. Name of Product / Model : Portable Golfsensor_RADAR / GZ-GWRS-22

4. Manufacturer / Country of Origin : Teravalue Inc., / Korea

5. FCC ID : N5Y-GZ-GWRS-22

7. Date of Test : 2022-08-09 to 2022-11-24

8. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

9. Test method used : Part 1.1310

10. Test Result : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	Name : Taeyoung Kim (Signature)	Name : Harim Lee (Signature)

2023-02-15

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-02-15	Originally issued	-

Note. The report No. KR22-SRF0124 is superseded by the report No. KR22-SRF0124-A.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

CONTENTS

1. General information

Client	:	Golfzon. co., LTD
Address	:	GOLFZON TOWER SEOUL 10~11F, 13F~17F, 19F, 735, Yeongdong-daero, Gangnam, Seoul, Republic of Korea.
Manufacturer	:	Teravalue Inc.,
Address	:	70, Gasan digital 2-ro, Geumcheon-gu, Seoul, Republic of Korea
Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Portable Golfsensor_RADAR
Model	:	GZ-GWRS-22
Frequency range	:	2 412 ㎒ ~ 2 462 ㎒ (WIFI_802.11b/g/n_HT20) 2 402 ㎒ ~ 2 480 ㎒ (Bluetooth Low Energy) 24 150 ㎒ (24 ㎓ radar sensor)
Modulation technique	:	WIFI(802.11b/g/n20)_DSSS, OFDM GFSK (Bluetooth Low Energy) CW(24 ㎓ radar sensor)
Number of channels	:	11 ch (WIFI_802.11b/g/n_HT20) 40 ch (Bluetooth Low Energy)
Power source	:	DC 7.2 V
Antenna specification	:	Cable dipole antenna (WIFI, Bluetooth Low Energy) Patch Array antenna (24 ㎓ radar sensor)
Antenna gain	:	-8.68 ㏈i (WIFI, Bluetooth Low Energy) 2.37 ㏈i (24 ㎓ radar sensor)
Software version	:	Wave-R1-230201-146
Hardware version	:	Wave Radar V1.0
Operation temperature	:	-10 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
AC Adapter	Channel Well Technology	KPL-040F-VI	N/A	Input : 100-240V / 50/60Hz 1.7A Output : 12.0V/3.33A

2.2. Frequency/channel operations

This device contains the following capabilities:
Bluetooth Low Energy, WIFI (802.11b/g/n HT20), 24 ㎓ radar sensor

Ch.	Frequency (㎒)
00	2 402
.	.
19	2 440
.	.
39	2 480

Table 2.2.1. Bluetooth Low Energy

Ch.	Frequency (㎒)
01	2 412
.	.
06	2 437
.	.
11	2 462

Table 2.2.2. WIFI (802.11b/g/n HT20)

Ch.	Frequency (㎒)
-	24 150

Table 2.2.3. 24 ㎓ radar sensor

3. Antenna requirement

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.
All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (±)
Conducted RF power	0.9 ㏈

4. RF Exposure

Regulation

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC rules and Regulations.
The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1.
According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Table 1 – Limits for Maximum Permissible Exposure (MPE)

Frequency Range (㎒)	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [㎽/㎠]	Averaging Time [minute]
(A) Limits for Occupational / Controlled Exposure				
0.3 ~ 3.0	614	1.63	*100	6
3.0 ~ 30	1842/f	4.89/f	*900/f²	6
30 ~ 300	61.4	0.163	1.0	6
300 ~ 1 500	/	/	f/300	6
1 500 ~ 15 000	/	/	5	6
(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/f²	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

*f=frequency in ㎒, *= plane-wave equivalent power density*

Per the guidance of KDB 680106, the E-field and H-field limits shown in the table above are extended down to 100 ㎑

MPE (Maximum Permissive Exposure) Prediction

Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad \left(\Rightarrow R = \sqrt{PG/4\pi S}\right)$$

S = power density [㎽/㎠]
P = Power input to antenna [㎽]
G = Power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna [㎝]

4.1. Test results

Calculation Result of RF exposure

Maximum tune-up tolerance (Worst Case)

Mode	Frequency [㎒]	Max Tune-up Power [dBm]	Max Tune-up Power [㎽]	Ant Gain [dBi]	Ant Gain [㎽]	Power density at 20 ㎝ [㎽/㎠]	Limit [㎽/㎠]
BLE_1M Bits/s	2 480	4	2.51	-8.68	0.14	0.000 07	1.000
2.4 ㎓ WLAN 802.11b	2 462	13	19.95	-8.68	0.14	0.000 54	1.000

Mode	Frequency [㎒]	EIRP Max Tune-up Power [dBm]	EIRP Max Tune-up Power [㎽]	Power density at 20 ㎝ [㎽/㎠]	Limit [㎽/㎠]
24 ㎓ radar sensor	24 150	11	0.40	0.002 50	1.000

EIRP dBm = EIRP dBuV/m@3m − 95.23dB

Note.

1. The power density P_d at a distance of 20 ㎝ calculated from the friis transmission Formula is far below the limit of 1 ㎽/㎠.

Simultaneous transmission

Note: Calculation of MPE ratio with simultaneous transmission for RF exposure test exemption.

Bluetooth LE_GFSK: the ratio is 0.000 07 / 1.000 00
WLAN_11b: the ratio is 0.000 54 / 1.000 00
24 ㎓ radar sensor: the ratio is 0.002 50 / 1.000 00
Case 1(Bluetooth LE + 24 ㎓ radar sensor) : (0.000 07 / 1.000 00) + (0.002 50 / 1.000 00) = 0.002 57 ≤ 1.0
Case 2(2.4 ㎓ WLAN + + 24 ㎓ radar sensor): (0.000 54 / 1.000 00) + (0.002 50 / 1.000 00) = 0.003 04 ≤ 1.0

Confirm the sum result of individual MPEs ratio is ≤ 1.0;

5. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	23.10.14*
Horn antenna	ETS.lindgren	3116	86635	23.05.04
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000997	23.07.12
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Signal Generator	R&S	SMB100A	176206	24.01.19
Power Sensor	R&S	NRP-Z81	1137.9009.02-106223-bB	23.05.02
Attenuator	R&S	DNF Dämpfungsglied 10 dB in N-50 Ohm	0001	23.05.02

* Tests related to this equipment were progressed after the calibration was completed.

End of test report