



# TEST REPORT

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Eurofins KCTL Co.,Ltd.</b><br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 16677, Korea<br>TEL: 82-70-5008-1021 FAX: 82-505-299-8311<br><a href="http://www.kctl.co.kr">www.kctl.co.kr</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Report No.:<br><b>KR23-SRF0089-A</b><br>Page (1) of (8) |    <b>KCTL</b> |
| <p><b>1. Client</b></p> <p>◦ Name : VC Inc.</p> <p>◦ Address : 23, Teheran-ro 108-gil, Gangnam-gu, Seoul, Republic of Korea</p> <p>◦ Date of Receipt : 2022-12-13</p> <p><b>2. Use of Report</b> : Certification</p> <p><b>3. Name of Product / Model</b> : Swing Caddie / SC4</p> <p><b>4. Manufacturer / Country of Origin</b> : VC Inc. / Korea</p> <p><b>5. FCC ID</b> : 2ABTKSC4</p> <p><b>7. Date of Test</b> : 2023-02-14 to 2023-02-28</p> <p><b>8. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing<br/>         (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)</p> <p><b>9. Test method used</b> : Part 1.1310</p> <p><b>10. Test Result</b> : Refer to the test result in the test report</p> |                                                         |                                                                                                   |
| Affirmation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Tested by<br><br>Name : Minki Kim (Signature)           | Technical Manager<br><br>Name : Heesu Ahn (Signature)                                             |
| <p style="text-align: right;">2023-04-07</p> <p style="text-align: center;"><b>Eurofins KCTL Co.,Ltd.</b></p> <p>As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                   |

## REPORT REVISION HISTORY

| Date       | Revision          | Page No |
|------------|-------------------|---------|
| 2023-03-31 | Originally issued | -       |
| 2023-04-07 | Updated           | 4,7     |
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Note. The report No. KR23-SRF0089 is superseded by the report No. KR23-SRF0089-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

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## 1. General information

Client : VC Inc.  
 Address : 23, Teheran-ro 108-gil, Gangnam-gu, Seoul, Republic of Korea  
 Manufacturer : VC Inc.  
 Address : 23, Teheran-ro 108-gil, Gangnam-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 : Swing Caddie  
 Model : SC4  
 Modulation technique : GFSK (Bluetooth Low Energy)  
                                   FMCW (24 GHz radar sensor)  
 Number of channels : 40 ch (Bluetooth Low Energy)  
                                   1 ch (24 GHz radar sensor)  
 Power source : DC 3.85 V (Battery)  
 Antenna specification : Chip antenna (Bluetooth Low Energy)  
                                   PCB Array antenna (24 GHz radar sensor)  
 Antenna gain : 1.8 dBi (Bluetooth Low Energy)  
                                   8.05 dBi (24 GHz radar sensor)  
 Frequency range : 2 402 MHz ~ 2 480 MHz (Bluetooth Low Energy)  
                                   24 050 MHz ~ 24 250 MHz (24 GHz radar sensor)  
 Software version : 1.0  
 Hardware version : 1.0  
 Test device serial No. : SC40B23001067  
 Operation temperature : -10 °C ~ 50 °C

## 2.1. Frequency/channel operations

This device contains the following capabilities:

Bluetooth Low Energy, 24 GHz radar sensor

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

Table 2.1.1. Bluetooth Low Energy

| Ch. | Frequency (MHz) |
|-----|-----------------|
| 0   | 24 111.9        |

Table 2.1.2. 24 GHz 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 or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter          | Expanded uncertainty ( $\pm$ ) |
|--------------------|--------------------------------|
| Conducted RF power | 0.9 dB                         |

## 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<br>(MHz)                                  | Electric Field<br>Strength<br>[V/m] | Magnetic Field<br>Strength<br>[A/m] | Power Density<br>[mW/cm <sup>2</sup> ] | Averaging<br>Time<br>[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/f <sup>2</sup>                    | 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/f <sup>2</sup>                    | 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 MHz, \* = 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 kHz

### MPE (Maximum Permissible Exposure) Prediction

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

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

S = power density [mW/cm<sup>2</sup>]

P = Power input to antenna [mW]

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 [cm]

## 4.1. Test results

### Calculation Result of RF exposure

Maximum tune-up tolerance (Worst Case)

| Mode          | Frequency [MHz] | Max Tune-up Power [dBm] | Max Tune-up Power [mW] | Ant Gain [dBi] | Ant Gain [mW] | Power density at 20 cm [mW/cm <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|---------------|-----------------|-------------------------|------------------------|----------------|---------------|----------------------------------------------|-----------------------------|
| BLE_1M Bits/s | 2 402           | 0.00                    | 1.00                   | 1.80           | 1.51          | 0.000 30                                     | 1.00                        |

| Mode                | Frequency [MHz] | Max Tune-up Power [dBm] | Max Tune-up Power [mW] | Power density at 20 cm [mW/cm <sup>2</sup> ] | Limit [mW/cm <sup>2</sup> ] |
|---------------------|-----------------|-------------------------|------------------------|----------------------------------------------|-----------------------------|
| 24 GHz radar sensor | 24 111.9        | 10.00                   | 10.00                  | 0.001 99                                     | 1.00                        |

EIRP dBm = EIRP dBuV/m@3m - 95.23dB

#### Note.

- The power density  $P_d$  at a distance of 20 cm calculated from the friis transmission  
Formula is far below the limit of 1 mW/cm<sup>2</sup>.

### Simultaneous transmission

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

Bluetooth LE\_GFSK: the ratio is 0.000 30 / 1.000 00

24 GHz radar sensor: the ratio is 0.001 99 / 1.000 00

Case 1(Bluetooth LE + 24 GHz radar sensor) : (0.000 30 / 1.000 00) + (0.001 99 / 1.000 00) = 0.002 29 ≤ 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     | 3117                        | 155787                 | 23.09.29       |
| AMPLIFIER         | B&Z Technologies | BZRT-00504000-481055-382525 | 26299-27735            | 23.09.19       |
| Signal Generator  | R&S              | SMB100A                     | 176206                 | 24.01.19       |
| Power Sensor      | R&S              | NRP-Z81                     | 1137.9009.02-106224-tg | 23.06.23       |
| Attenuator        | HP               | 8491A                       | 18591                  | 24.01.19       |
| Antenna Mast      | Innco Systems    | MA4640-XP-ET                | -                      | -              |
| Turn Table        | Innco Systems    | CO3000                      | 1175/45850319/P        | -              |

**End of test report**

