EMF TEST REPORT

Test Report No.	**: OT-247-RWD-009**
Reception No.	**: 2405001696**
Applicant	**: JCFTechnology Inc.**
Address	**: B-805, Woolim Lions Valley, 168, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea**
Manufacturer	**: JCFTechnology Inc.**
Address	**: B-805, Woolim Lions Valley, 168, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea**
Type of Equipment	**: Vital signs monitoring Radar sensor**
FCC ID	**: 2BHHG-VSR22-WR**
Model Name	**: VSR22-WR**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 7 pages (including this page)**
Date of Incoming	**: May 22, 2024**
Date of Issuing	**: July 15, 2024**

SUMMARY

The equipment complies with the requirements of *FCC CFR 47 PART 15 SUBPART C Section 15.249*

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.

Tested by	Reviewed by	Approved by
Si-eon Lee / Senior Project Engineer	Tae-Ho, Kim / Chief Engineer	Jae-Ho, Lee / Chief Engineer
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-247-RWD-009	July 15, 2024	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant   : JCFTechnology Inc.

Address   : B-805, Woolim Lions Valley, 168, Gasan digital 1-ro, Geumcheon-gu, Seoul, South Korea

Contact Person   : HOYOUNG JI / Assistant Manager

Telephone No.   : +82 2-867-7733/+82 2-867-7744

FCC ID   : 2BHHG-VSR22-WR

Model Name   : VSR22-WR

Brand Name   : -

Serial Number   : N/A

Date   : July 15, 2024

DEVICE TYPE	DXX – Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Vital signs monitoring Radar sensor
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.249
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The JCFTechnology Inc., Model VSR22-WR (referred to as the EUT in this report) is an Vital signs monitoring Radar

sensor, Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Vital signs monitoring Radar sensor
OPERATING FREQUENCY	24.128 6 GHz 2 402 MHz ~ 2 480 MHz, 2 412 MHz ~ 2 462 MHz, 2 402 MHz ~ 2 480 MHz
Field Strength of Fundamental	106.48 dBμV/m
ANTENNA TYPE	Array Antenna
ANTENNA GAIN	0 dBi

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

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4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are f/1500 mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G)} / d, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric filed strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combing equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

4.2 EUT Description

Kind of EUT	Vital signs monitoring Radar sensor
MAX. RF OUTPUT POWER	106.48 dBμV/m
Device Category	☐ Portable (< 20 cm separation) ■ Mobile (> 20 cm separation) ☐ Others
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A

4.3 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. Band (GHz)	Target Power W/tolerance (dBm)	Max tune up power		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(mW)			
24.128 6	11.28 ± 0.5	11.78	15.07	1.09	0.002 999	1.00

E.I.R.P(dBm) = 106.48 - 95.2 = 11.28 dBm

According to above table, for 24.128 6 GHz, safe distance,

D = 0.282 * $\sqrt{15.07/1.00}$ = 1.09 cm.

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 15.07 / (4 * \pi * 20^2) = 0.002\ 999$$

Where:
S = Power Density,
P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),
G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

Calculated MPE Safe Distance (FCCID: 2AC7Z-ESP32WROVERE (WLAN 2.4G & LE 1M))

Operating Freq. Band (MHz)	Operating Mode	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(mW)	Log	Linear			
2 412 ~ 2 462	802.11b	27.00	501.19	3.40	2.19	9.34	0.218 248	1.00
	802.11g	26.00	398.11			8.32	0.173 361	1.00
	802.11n HT20	26.00	398.11			8.32	0.173 361	1.00
	802.11n_HT40	27.00	501.19			9.34	0.218 248	1.00
2 402 ~ 2 480	Bluetooth	7.00	5.01			0.93	0.002 182	1.00
	Bluetooth LE	9.00	7.94			1.18	0.003 459	1.00

DATA for Intermodulation Transmit

Simultaneous Transmission	Operating Mode	Power Density (mW/cm²)	Sum Power Density (mW/cm²)	Limit (mW/cm²)
WLAN 2.4G + Bluetooth + 24.128 6 GHz	802.11b	0.218 248	0.224 706	1
	Bluetooth LE	0.003 459		
	24.128 6 GHz	0.002 999		

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