EMF TEST REPORT

Test Report No.	**: OT-248-RWD-005**
Reception No.	**: 2403001027**
Applicant	**: OTOS Wing Co.,Ltd.**
Address	**: 49, Dusan-ro 11-gil, Geumcheon-gu, Seoul, Korea**
Manufacturer	**: OTOS Wing Co.,Ltd.**
Address	**: 49, Dusan-ro 11-gil, Geumcheon-gu, Seoul, Korea**
Type of Equipment	**: Welding Camera**
FCC ID.	**: 2BHHTWGC400**
Model Name	**: WGC400**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 9 pages (including this page)**
Date of Incoming	**: April 24, 2024**
Date of issue	**: August 05, 2024**

SUMMARY

The equipment complies with the regulation; ***CFR §2.1093***

This test report only contains 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.

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

CONTENTS

Page

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

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-248-RWD-005	August 05, 2024	Initial Release	All

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

1. VERIFICATION OF COMPLIANCE

Applicant : OTOS Wing Co.,Ltd.

Address : 49, Dusan-ro 11-gil, Geumcheon-gu, Seoul, Korea

Contact Person : Kim, Byeong Ryeol / CTO

Telephone No. : +82-2-700-8090

FCC ID : 2BHHTWGC400

Model Name : WGC400

Brand Name : -

Serial Number : N/A

Date : August 05, 2024

E.U.T. DESCRIPTION	Welding Camera
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	KDB 447498 D01 General RF Exposure Guidance v06
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
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.

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

2. GENERAL INFORMATION

2.1 Product Description

The OTOS Wing Co.,Ltd., Model WGC400 (referred to as the EUT in this report) is a Welding Camera. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Welding Camera	
OPERATING FREQUENCY	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20)) 2 422 MHz ~ 2 452 MHz (802.11n(HT40))	
MODULATION TYPE	802.11b: DSSS Modulation (DBPSK/DQPSK/CCK) 802.11g/n(HT20)/n(HT40): OFDM Modulation (BPSK/QPSK/16QAM/64QAM)	
RF OUTPUT POWER	Antenna 0	15.67 dBm(802.11b) 16.13 dBm(802.11g) 13.15 dBm(802.11n_HT20) 13.21 dBm(802.11n_HT40)
	Antenna 1	14.04 dBm(802.11b) 14.63 dBm(802.11g) 12.13 dBm(802.11n_HT20) 12.34 dBm(802.11n_HT40)
	Multiple Antenna	14.83 dBm(802.11n_HT20) 15.60 dBm(802.11n_HT40)
ANTENNA TYPE	Dipole Antenna	
ANTENNA GAIN	Antenna 0	-1.20 dBi
	Antenna 1	-1.20 dBi
	Multiple Antenna	1.81 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32.768 KHz, 19.200 MHz, 27.000 MHz	

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

-. None

3. EUT MODIFICATIONS

-. None

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

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:

$E = \sqrt{(30 * P * G)} / d$, and $S = E^2 / Z = E^2 / 377$, because 1 mW/cm² = 10 W/m²

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	Welding Camera
Device Category	☐ Portable (< 20 cm separation) ☐ Mobile (> 20 cm separation) ■ Others
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A

4.3 Calculated MPE Safe Distance

4.3.1 DATA for Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	15.67 ± 1.0	16.67	46.45	-1.20	0.76	1.67	0.007 0	1
	802.11g	16.13 ± 1.0	17.13	51.64			1.77	0.007 8	1
	802.11n_ HT20	13.15 ± 1.0	14.15	26.00			1.25	0.003 9	1
	802.11n_ HT40	13.21 ± 1.0	14.21	26.36			1.26	0.004 0	1

According to above table, for 2 400 ~ 2483.5 MHz Band(802.11 b), safe distance,

D = 0.282 * √ (51.64 * 0.76)/1.00 = 1.77 cm.

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

$$S = P * G / (4\pi * R^2) = 51.64 * 0.76 / (4 * \pi * 20\text{^}2) = 0.007\ 8$$

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

4.3.2 DATA for Antenna 1

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	14.04 ± 1.0	15.04	31.92	-1.20	0.76	1.39	0.004 8	1
	802.11g	14.63 ± 1.0	15.63	36.56			1.49	0.005 5	1
	802.11n_ HT20	12.13 ± 1.0	13.13	20.56			1.11	0.003 1	1
	802.11n_ HT40	12.34 ± 1.0	13.34	21.58			1.14	0.003 3	1

According to above table, for 2 400 ~ 2483.5 MHz Band(802.11 b), safe distance,

$D = 0.282 * \sqrt{(31.91 * 0.76)/1.00} = 1.49$ cm.

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

$S = P * G / (4\pi * R^2) = 31.91 * 0.76 / (4 * \pi * 20\text{^}2) = 0.005\ 5$

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

4.3.3 DATA for Multiple Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance (dBm)	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
			(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11n_ HT20	14.83 ± 1.0	15.83	38.28	1.81	1.52	2.15	0.011 6	1
	802.11n_ HT40	15.60 ± 1.0	16.60	45.71			2.35	0.013 8	1

According to above table, for 2 400 ~ 2483.5 MHz Band(802.11n_ HT40), safe distance,

$D = 0.282 * \sqrt{(45.71 * 1.52)/1.00} = 2.35$ cm.

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

$S = P * G / (4\pi * R^2) = 45.71 * 1.52 / (4 * \pi * 20\text{^}2) = 0.013\ 8$

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

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