EMF TEST REPORT

Test Report No.	**: OT-234-RWD-018**
Reception No.	**: 2303000827**
Applicant	**: Nttworks Co., Ltd**
Address	**: 5-10, Nttworks Bldg. Tongil-ro 89-gil, Eunpyeong-gu, Seoul, 03328, South Korea**
Manufacturer	**: Nttworks Co., Ltd**
Address	**: 5-10, Nttworks Bldg. Tongil-ro 89-gil, Eunpyeong-gu, Seoul, 03328, South Korea**
Type of Equipment	**: Data transceiver**
FCC ID	**: 2BAO4-SUD100H**
Model No.	**: SUD-100H**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 7 pages (including this page)**
Date of Incoming	**: March 22, 2023**
Date of issuing	**: April 14, 2023**

SUMMARY

The equipment complies with the regulation; ***FCC CFR 47 PART 2.1091***

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 / Sr. 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)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-234-RWD-018	April 14, 2023	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : Nttworks Co., Ltd

Address : 5-10, Nttworks Bldg. Tongil-ro 89-gil, Eunpyeong-gu, Seoul, 03328, South Korea

Contact Person : Jun Young, Kim / Engineer

Telephone No. : +82-2-387-3790

FCC ID : 2BAO4-SUD100H

Model Name : SUD-100H

Brand Name : Syscall / Nttworks Co., Ltd

Serial Number : N/A

Date : April 14, 2023

EQUIPMENT CLASS	**DSC - Part 15, Security/Remote Control Transmitter**
E.U.T. DESCRIPTION	Data transceiver
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.

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2. GENERAL INFORMATION

2.1 Product Description

The Nttworks Co., Ltd, Model: SUD-100H (referred to as the EUT in this report) is a Transmitter that it controls locking and unlocking the door of a vehicle. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Data transceiver
TX FREQUENCY	433.42 MHz
RX FREQUENCY	433.42 MHz
MODULATION	FSK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>= 1 MHz)	32 MHz
DUTY CYCLE FACTOR	21.09 dB (Duty Cycle: 8.82 %)
ANTENNA TYPE	SMA Antenna
ANTEENA GAIN	3.14 dBi
RATED SUPPLY VOLTAGE	DC 5.0 V

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:

$E = \sqrt{(30 * P * G)} / d$, 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	Data transceiver
MAX. RF OUTPUT POWER	99.69 dBμV/m
Device Category	☐ Portable (< 20 cm separation) ■ Mobile (> 20 cm separation) ☐ Others
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A

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4.3 Calculated MPE Safe Distance

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			
433.42	FSK	4.49 ± 0.5	4.99	3.16	3.14	2.06	0.72	0.001 294	1.00

According to above table, for 433.42 MHz, safe distance,

$D = 0.282 * \sqrt{(3.16 * 2.06)/1.00} = 0.72$ cm.

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

$S = P * G / (4\pi * R^2) = 3.16 * 2.06 / (4 * \pi * 20\text{^}2) = 0.001\ 294$

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

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