EMF TEST REPORT

Test Report No. : **OT-24D-RWD-013**

Reception No. : **2410003745**

Applicant : **INDIRAIN Co., LTD.**

Address : **203, 62, Dosan-daero 1-gil, Gangnam-gu, Seoul, Korea**

Manufacturer : **INDIRAIN Co., LTD.**

Address : **203, 62, Dosan-daero 1-gil, Gangnam-gu, Seoul, Korea**

Type of Equipment : **Galaxy Smart Keeper (GSK)**

FCC ID. : **2BMI3-GSK-S202407**

Model Name : **GSK-S202407**

Multiple Model Name : **N/A**

Serial number : **N/A**

Total page of Report : **7 pages (including this page)**

Date of Incoming : **October 17, 2024**

Date of issue : **December 04, 2024**

SUMMARY

The equipment complies with the regulation; ***FCC CFR 47 PART 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
Yun-Bok, Wi / 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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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-24D-RWD-013	December 04, 2024	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : INDIRAIN Co., LTD.

Address : 203, 62, Dosan-daero 1-gil, Gangnam-gu, Seoul, Korea

Contact Person : Minju Kim / AE

Telephone No. : +82-2-514-3374

FCC ID : 2BMI3-GSK-S202407

Model Name : GSK-S202407

Brand Name : -

Serial Number : N/A

Date : December 04, 2024

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Galaxy Smart Keeper (GSK)
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 INDIRAIN Co., LTD., Model GSK-S202407 (referred to as the EUT in this report) is a Galaxy Smart Keeper (GSK).

The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Galaxy Smart Keeper (GSK)	
Temperature Range	0 °C ~ +60 °C	
Operating Frequency	2 402 MHz ~ 2 480 MHz	
MAX. RF OUTPUT POWER	Antenna 1 (CC2640R2F)	11.11 dBm
	Antenna 2 (CC2460R2F)	11.02 dBm
	Antenna 3 (CC2642R1)	3.11 dBm
Number of Channel	40 Channels	
Modulation Type	GFSK	
Antenna Type	Antenna 1 (CC2640R2F)	PCB Antenna
	Antenna 2 (CC2460R2F)	Dipole Antenna
	Antenna 3 (CC2642R1)	PCB Antenna
Antenna Gain	Antenna 1 (CC2640R2F)	4.60 dBi
	Antenna 2 (CC2460R2F)	4.41 dBi
	Antenna 3 (CC2642R1)	4.60 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	32.768 kHz, 24 MHz, 48 MHz	
Rated Supply Voltage	DC 5.0 V	

Note: This Device use two RF Chipset(CC2640R2F, CC2642R1). and CC2640R2F works a Diversity Antenna.

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

-. None

3. EUT MODIFICATIONS

-. None

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4. RF EXPOSURE EVALUATION

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	Galaxy Smart Keeper (GSK)
Device Category	☐ Portable (< 20 cm separation) ■ Mobile (> 20 cm separation) ☐ Others
Exposure Evaluation Applied	■ MPE ☐ SAR Exclusion ☐ N/A

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4.3 Test Result

Antenna Port	Operating Freq. Band (MHz)	Target Power W/tolerance (dBm)	Max tune-up Power		Antenna Gain (log)	Antenna Gain (Linear)	Safe Distance (cm)	Power Density @ 20 cm (mW/cm^2)
			(dBm)	(mW)				
Antenna 1 (CC2640R2F)	2 402.00	11.11 ± 1.0	12.11	16.26	4.60	2.884	1.931	0.009 33
Antenna 2 (CC2640R2F)	2 402.00	11.02 ± 1.0	12.02	15.92	4.41	2.761	1.870	0.008 74
Antenna 3 (CC2642R1)	2 402.00	3.11 ± 1.0	4.11	2.58	4.60	2.884	0.769	0.001 48

According to above table, for 2 402 ~ 2480 MHz Band, safe distance,

D = 0.282 * √ (16.26 * 2.884)/1.00 = 1.931 cm.

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

$S = P * G / (4\pi * R^2) = 16.26 * 2.884 / (4 * \pi * 20\text{^}2) = 0.009\ 33$

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

DATA for Intermodulation Transmit

According to above equation, the following result was obtained.

Antenna Port	Frequency (MHz)	Target Power W/tolerance (dBm)	Max tune-up Power		Antenna Gain (log)	Antenna Gain (Linear)	Safe Distance (cm)	Power Density @ 20 cm (mW/cm^2)	Limit of Power Density (mW/cm^2)	Simultaneous Power Density (mW/cm^2)
			(dBm)	(mW)						
Antenna 1 (CC2640R2F)	2 402.00	11.11 ± 1.0	12.11	16.26	4.60	2.884	1.931	0.009 33	1.00	0.000 089
+ Antenna 3 (CC2642R1)	2 402.00	3.11 ± 1.0	4.11	2.58	4.60	2.884	0.769	0.001 48	1.00	
Antenna 2 (CC2640R2F)	2 402.00	11.02 ± 1.0	12.02	15.92	4.41	2.761	1.870	0.008 74	1.00	0.000 079
+ Antenna 3 (CC2642R1)	2 402.00	3.11 ± 1.0	4.11	2.58	4.60	2.884	0.769	0.001 48	1.00	

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