RADIO PERFORMANCE TEST REPORT (CLASS I PERMISSIVE CHANGE)

Test Report No.	**: OT-249-RWD-025**
Reception No.	**: 2406002227**
Applicant	**: SJIT Co.,Ltd**
Address	**: 54-11, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do 18423, Republic of Korea**
Manufacturer	**: SJIT Co.,Ltd**
Address	**: 54-11, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do 18423, Republic of Korea**
Type of Equipment	**: Monarch Quad-mode module**
IC	**: 32019-SRM200A**
Model Name	**: SRM200A**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 14 pages (including this page)**
Date of Incoming	**: May 20, 2020**
Date of issue	**: September 09, 2024**

SUMMARY

The equipment complies with the regulation; ***IC RSS-Gen Issue 5 April 2018 and RSS-247 Issue 3, August 2023***

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
Myeong-Hwa, Jang / 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)

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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-249-RWD-025	September 09, 2024	Class I Permissive Change	All

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1. VERIFICATION OF COMPLIANCE

Applicant : SJIT Co.,Ltd

Address : 54-11, Dongtanhana 1-gil, Hwaseong-si, Gyeonggi-do 18423, Republic of Korea

Contact Person : Kwanghyeon KIM / Senior researcher

Telephone No. : +82-10-2363-0291

IC : 32019-SRM200A

Model Name : SRM200A

Brand Name : -

Serial Number : N/A

Date : September 09, 2024

EQUIPMENT CLASS	Low Power License-Exempt Radio-communication Device
E.U.T. DESCRIPTION	Monarch Quad-mode module
THIS REPORT CONCERNS	Class I Permissive Change
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER IC RULES PART(S)	IC RSS-Gen Issue 5, April 2018 and RSS-247 Issue 3, August 2023
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the IC 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. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
RSS-247, 5.1(b)	Carrier Frequency Separation	N/A (See Note 1)
RSS-GEN 6.7 & RSS-247, 5.1(c)	Occupied bandwidth and 20 dB bandwidth	N/A (See Note 1)
RSS-247, 5.1(c)	Minimum Number of Hopping Channels	N/A (See Note 1)
RSS-247, 5.1(c)	Average Time of Occupancy	N/A (See Note 1)
RSS-247, 5.4(a)	Maximum Peak Conducted Output Power	N/A (See Note 1)
RSS-247, 5.5	100 kHz Bandwidth Outside the Frequency Band	N/A (See Note 1)
RSS-247, 5.5	Radiated Emission which fall in the Restricted Band	N/A (See Note 1)
RSS-247, 5.5	Radiated Emission Limits, General Requirement	Met the Limit / PASS (See Note 2)
RSS-GEN 8.8	Conducted Limits	N/A (See Note 1)
RSS-GEN 6.8	Antenna Requirement	N/A (See Note 1)

Note 1.: The EUT have a RF Test already approved. (Model: SRM200A / IC: 32019-SRM200A)

Note 2.: The Radiated Emission test was performed for the additional models and It only states worst case of test

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

CLASS I Permissive Change, The EUT was granted on August 08, 2024.

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in IC RSS-Gen Issue 5 April 2018 and RSS-247 Issue 3, August 2023.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The SJIT Co.,Ltd, Model SRM200A (referred to as the EUT in this report) is an Monarch Quad-mode module. The product specification described herein was obtained from product data sheet or user's manual.

<table>
<tr><td>DEVICE TYPE</td><td colspan="3">Monarch Quad-mode module</td></tr>
<tr><td>Temperature Range</td><td colspan="3">-30 °C ~ 60 °C</td></tr>
<tr><td rowspan="3">OPERATING FREQUENCY</td><td>Sig Fox</td><td colspan="2">902.137 5 MHz ~ 904.662 5 MHz (RC2)
920.737 5 MHz ~ 923.262 5 MHz (RC4)</td></tr>
<tr><td>Bluetooth LE</td><td colspan="2">2 402 MHz ~ 2 480 MHz</td></tr>
<tr><td>WLAN 2.4 GHz</td><td colspan="2">2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))</td></tr>
<tr><td rowspan="3">MODULATION TYPE</td><td>Sig Fox</td><td colspan="2">DBPSK</td></tr>
<tr><td>Bluetooth LE</td><td colspan="2">GFSK</td></tr>
<tr><td>WLAN 2.4 GHz</td><td colspan="2">802.11b: DSSS Modulation(DBPSK/DQPSK/CCK)
802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)</td></tr>
<tr><td rowspan="5">RF OUTPUT POWER</td><td>Sig Fox</td><td colspan="2">25.364 dBm</td></tr>
<tr><td rowspan="2">Bluetooth LE</td><td>Peak</td><td>3.68 dBm</td></tr>
<tr><td>Average</td><td>3.60 dBm</td></tr>
<tr><td rowspan="2">WLAN 2.4 GHz</td><td>Peak</td><td>17.38 dBm(802.11b)
20.05 dBm(802.11g)
19.91 dBm(802.11n_HT20)</td></tr>
<tr><td>Average</td><td>11.55 dBm(802.11b)
12.17 dBm(802.11g)
12.09 dBm(802.11n_HT20)</td></tr>
<tr><td colspan="2">ANTENNA TYPE</td><td colspan="2">Sig Fox : Metal Antenna(IET10MO)
Bluetooth LE / WLAN 2.4 GHz : Chip Antenna(IET10MO)</td></tr>
<tr><td colspan="2">ANTENNA GAIN</td><td colspan="2">Sig Fox: 2.50 dBi
Bluetooth LE: 2.50 dBi
WLAN 2.4 GHz: 2.50 dBi</td></tr>
<tr><td colspan="2">List of each Osc. or crystal Freq.(Freq. >= 1 MHz)</td><td colspan="2">32.768 kHz, 26 MHz, 32 MHz</td></tr>
</table>

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

-. None

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4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	IC
Module	SJIT Co.,Ltd	SRM200A	32019-SRM200A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
SRM200A	SJIT Co.,Ltd	Monarch Quad-mode module(EUT)	-
nRF52840-Preview-DK	NORDIC SEMICONDUCTOR	Jig Board	EUT
T10 DL Board V3	N/A	Jig Board	EUT
HP Probook	HP	Notebook PC	-
PPP009C	LIE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	AC Adapter	-

5.3 Configuration of Test System

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.4 Antenna Requirement

For intentional device, according to RSS-Gen Issue 5 Section 6.8, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The antenna of the EUT is Metal Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

7. RADIATED EMISSION TEST

7.1 Operating environment

Temperature : 24.3 °C

Relative humidity : 43.9 % R.H.

7.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 10.0 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

7.3 Test Date

May 21, 2020 ~ May 25, 2020

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7.4 Test data for 30 MHz ~ 1000 MHz

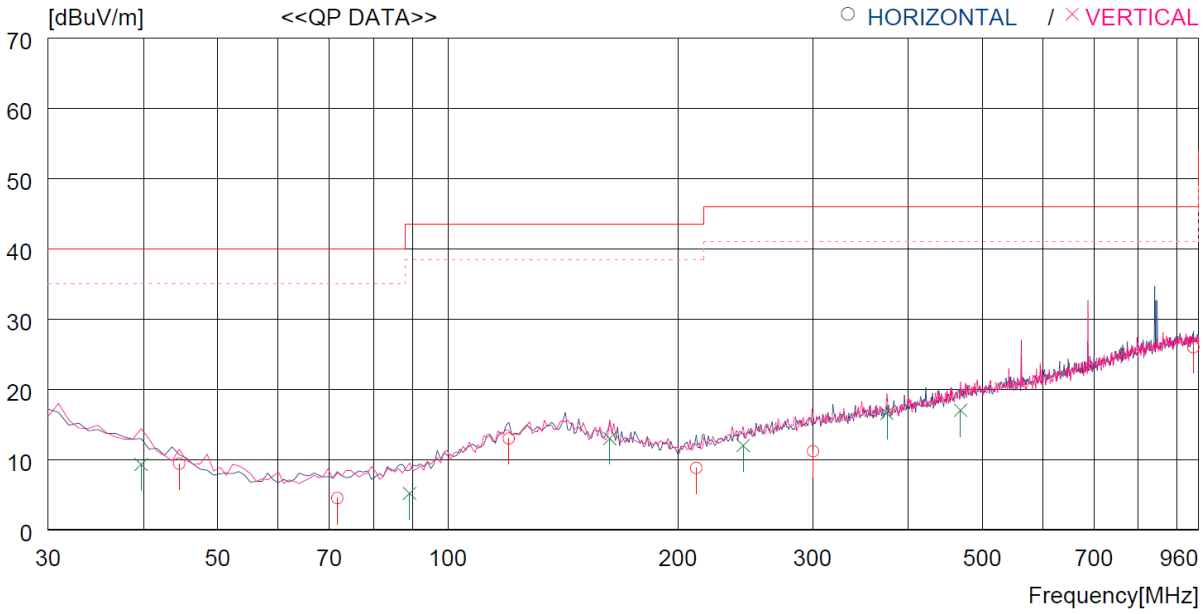
Limits apply to : RSS-247 Issue 3

Result : PASSED

EUT : Monarch Quad-mode module

Test mode : Worst case

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	44.550	21.0	19.4	1.5	32.5	9.4	40.0	30.6	400	0
2	71.710	17.9	17.3	1.8	32.5	4.5	40.0	35.5	100	357
3	120.210	26.6	16.7	2.2	32.5	13.0	43.5	30.5	200	0
4	211.390	22.8	15.7	2.8	32.5	8.8	43.5	34.7	100	359
5	300.630	21.1	19.3	3.3	32.5	11.2	46.0	34.8	200	0
6	944.698	21.7	29.4	6.2	31.3	26.0	46.0	20.0	200	0
----- Vertical ------										
7	39.700	21.5	18.9	1.4	32.5	9.3	40.0	30.7	200	242
8	89.170	22.0	13.7	2.0	32.5	5.2	43.5	38.3	300	65
9	162.890	24.1	19.0	2.4	32.5	13.0	43.5	30.5	200	359
10	243.400	24.1	17.3	3.0	32.4	12.0	46.0	34.0	100	0
11	375.320	24.3	21.0	3.8	32.5	16.6	46.0	29.4	100	350
12	468.441	22.2	23.2	4.1	32.5	17.0	46.0	29.0	300	255

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7.5 Test data for Below 30 MHz

-. Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)

-. Frequency range : 9 kHz ~ 30 MHz

-. Measurement distance : 3 m

-. Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

7.6 Test data for above 1 GHz

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode

1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 10.0 GHz

-. Measurement distance : 3 m

-. Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBµV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBµV/m)	Limits (dBµV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

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8. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40	Rohde & Schwarz	Signal Analyzer	101009	Feb. 21, 2020 (1Y)
ESW	Rohde & Schwarz	EMI Test Receiver	101851	Aug. 07, 2019 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	312544	Mar. 16, 2020 (1Y)
BBV 9718B	Schwarzbeck	Broadband Preamplifier	00009	Mar. 16, 2020 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Feb. 20, 2020 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 24, 2019 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
VULB9163	Schwarzbeck	TRILOG Broadband Antenna	777	Apr. 08, 2020 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 16, 2019 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 07, 2020 (1Y)