ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : **W156R-D003**

AGR No. : **A155A-149**

Applicant : **Remote Solution Co., Ltd.**

Address : **92, Chogokri, Nammyun, Kimchon city, Kyungbuk, Korea, 740-871**

Manufacturer : **Remote Solution Co., Ltd.**

Address : **92, Chogokri, Nammyun, Kimchon city, Kyungbuk, Korea, 740-871**

Type of Equipment : **Smart Home Sensor**

FCC ID. : **TX4ES60A**

Model Name : **SD01A**

Multiple Model Name : **SA01A, SB01A, SC01A**

Serial number : **N/A**

Total page of Report : **6 pages (including this page)**

Date of Incoming : **June 01, 2015**

Date of issue : **June 03, 2015**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 SUBPART C Section 15.247***

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.

Reviewed by: Ki-Hong, Nam / Asst, Chief Engineer
ONETECH Corp.

Approved by: Sung-Ik, Han/ Managing Director
ONETECH Corp.

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EMC Testing Div. : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

CONTENTS

PAGE

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W156R-D003	June 03, 2015	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: Remote Solution Co., Ltd.
Address	: 92, Chogokri, Nammyun, Kimchon city, Kyungbuk, Korea, 740-871
Contact Person	: Byung-Cheol, Kim / Manager
Telephone No.	: +82-54-420-4517
FCC ID	: TX4ES60A
Model Name	: SD01A
Serial Number	: N/A
Date	: June 03, 2015

EQUIPMENT CLASS	***DTS – DIGITAL TRNSMISSION SYSTEM***
E.U.T. DESCRIPTION	Smart Home Sensor
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
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 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 Remote Solution Co., Ltd., Model SD01A (referred to as the EUT in this report) is a Smart Home Sensor. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
FREQUENCY RANGE	2 405 MHz ~ 2 475 MHz
Channel Number	15
MAX. RF OUTPUT POWER:	19.19 dBm
NUMBER OF LAYER	4 Layers
ANTENNA TYPE	F-Antenna
ANTENNA GAIN	0.27 dBi
MODULATION METHOD	GFSK
USED RF CHIP	Marker: GreenPeak Technologies Model Name: GP490
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	16 MHz
POWER REQUIREMENT	DC 3.0 V
EXTERNAL CONNECTOR	-

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

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
SD01A	Basic Model	☑
SC01A	This models are Humidity Sensor there is no difference on RF.	☐
SB01A	This models are Temperature Sensor there is no difference on RF.	☐
SA01A	This models are Door/Window Sensor there is no difference on RF.	☐

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

3. EUT MODIFICATIONS

-. None

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4. RADIO FREQUENCY 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 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Operating Freq. Band (MHz) Frequency	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
	(dBm)	(dBm)	(mW)	Log	Linear			
2 405 ~ 2 475	19.0 ± 0.5	19.5	89.13	0.27	1.06	2.74	0.018 8	1.00

According to above table, for 2 405 ~ 2 480 MHz Band, safe distance,

$D = 0.282 * \sqrt{(89.13 * 1.06)/1.00} = 2.74$ cm.

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

$S = P * G / (4\pi * R^2) = 89.13 * 1.06 / (4 * 3.14 * 20^2) = 0.0188$

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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