

# 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

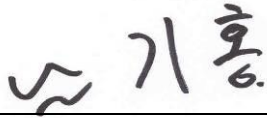
## SUMMARY

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

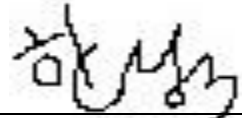
This test report only contains the result of a single test of the sample supplied for the examination.

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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**Revision History**

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

## 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                                         | <b><i>DTS – DIGITAL TRNSMISSION SYSTEM</i></b> |
| 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<br>AUTHORIZATION REQUESTED            | Certification                                  |
| EQUIPMENT WILL BE OPERATED<br>UNDER FCC RULES PART(S)   | FCC PART 15 SUBPART C Section 15.247           |
| MODIFICATIONS ON THE EQUIPMENT<br>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.

## 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<br>Model Name: GP490 |
| List of each Osc. or crystal<br>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                                                      | <input checked="" type="checkbox"/> |
| SC01A      | This models are Humidity Sensor there is no difference on RF.    | <input type="checkbox"/>            |
| SB01A      | This models are Temperature Sensor there is no difference on RF. | <input type="checkbox"/>            |
| SA01A      | This models are Door/Window Sensor there is no difference on RF. | <input type="checkbox"/>            |

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

## 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  $f/1500 \text{ mW/cm}^2$  for the frequency range between 300 MHz and 1 500 MHz and  $1.0 \text{ mW/cm}^2$  for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a  $1 \text{ mW/cm}^2$  exposure is calculated as follows:

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

Where

$S$  = Power density in  $\text{mW/cm}^2$ ,  $Z$  = Impedance of free space,  $377 \Omega$

$E$  = Electric field strength in  $\text{V/m}$ ,  $G$  = Numeric antenna gain, and  $d$  = distance in meter

Combining 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  $\text{mW}$  and  $\text{cm}$ , using  $P (\text{mW}) = P (\text{W}) / 1000$ ,  $d (\text{cm}) = 0.01 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

$d$  = distance in  $\text{cm}$ ,  $P$  = Power in  $\text{mW}$ ,  $G$  = Numeric antenna gain, and  $S$  = Power density in  $\text{mW/cm}^2$

### 4.2 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

| Operating Freq.<br>Band (MHz) Frequency | Target Power<br>W/tolerance | Max tune up<br>power |       | Antenna Gain |        | Safe<br>Distance<br>(cm) | Power<br>Density<br>( $\text{mW/cm}^2$ )<br>@ 20 cm<br>Separation | Limit<br>( $\text{mW/cm}^2$ ) |
|-----------------------------------------|-----------------------------|----------------------|-------|--------------|--------|--------------------------|-------------------------------------------------------------------|-------------------------------|
|                                         | (dBm)                       | (dBm)                | (mW)  | Log          | Linear |                          |                                                                   |                               |
| 2 405 ~ 2 475                           | $19.0 \pm 0.5$              | 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,

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

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