

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR TRANSMITTER

**Test Report No.** : OT-197-RWD-005  
**AGR No.** : A196A-235  
**Applicant** : Suntech International Ltd.  
**Address** : (Gasam-dong, Greatvalley), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea  
**Manufacturer** : Suntech International Ltd.  
**Address** : (Gasam-dong, Greatvalley), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea  
**Type of Equipment** : Tracking Device  
**FCC ID.** : WA2ST3500  
**Model Name** : ST3500  
**Serial number** : N/A  
**Total page of Report** : 9 pages (including this page)  
**Date of Incoming** : June 21, 2019  
**Date of issue** : July 08, 2019

## SUMMARY

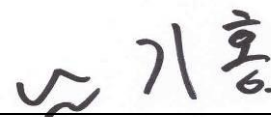
The equipment complies with the regulation; **FCC PART Part 2, Part 22 Subpart H, Part 24 Subpart E**  
 This test report only contains the result of a single test of the sample supplied for the examination. It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:



Tae-Ho, Kim / Senior Manager  
ONETECH Corp.

Approved by:



Ki-Hong, Nam / Chief Engineer  
ONETECH Corp.

## CONTENTS

### PAGE

|  |          |
|--|----------|
| <b>1. VERIFICATION OF COMPLIANCE .....</b>                                     | <b>4</b> |
| <b>2. GENERAL INFORMATION.....</b>   | <b>5</b> |
| <b>2.1 PRODUCT DESCRIPTION.....</b>  | <b>5</b> |
| <b>2.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....</b> | <b>5</b> |
| <b>3. EUT MODIFICATIONS.....</b>   | <b>5</b> |
| <b>4. MAXIMUM PERMISSIBLE EXPOSURE.....</b>                                    | <b>6</b> |
| <b>4.1 RF EXPOSURE CALCULATION .....</b>                                       | <b>6</b> |
| <b>4.2 EUT DESCRIPTION.....</b>  | <b>7</b> |
| <b>5 EVALUATION RESULTS .....</b>  | <b>8</b> |
| <b>5.1 ASSESSMENT RESULT OF RF POWER AND ANTENNA GAIN.....</b>                 | <b>8</b> |
| <b>5.1.1 WCDMA Band 2 .....</b>  | <b>8</b> |
| <b>5.1.2 WCDMA Band 5 .....</b>  | <b>8</b> |
| <b>5.1.3 Calculated MPE Safe Distance .....</b>                                | <b>9</b> |

**Revision History**

| Rev. No. | Issue Report No. | Issued Date   | Revisions       | Section Affected |
|----------|------------------|---------------|-----------------|------------------|
| 0        | OT-197-RWD-005   | July 08, 2019 | Initial Release | All              |
|          |                  |               |                 |                  |
|          |                  |               |                 |                  |

## 1. VERIFICATION OF COMPLIANCE

Applicant : Suntech International Ltd.  
Address : (Gasam-dong, Greatvally), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea  
Contact Person : Yohan Kim / Manager  
Telephone No. : 82-2-6327-5661  
FCC ID : WA2ST3500  
Model Name : ST3500  
Serial Number : N/A  
Date : July 08, 2019

|   |   |
|---|---|
| EQUIPMENT CLASS   | PCB-PCS Licensed Transmitter                          |
| KIND OF EQUIPMENT                                       | Tracking Device                                       |
| THIS REPORT CONCERNS                                    | Original Grant  |
| MEASUREMENT PROCEDURES                                  | ANSI C63.26:2015, KDB Publication 971168 D01          |
| 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 Part 2, Part 22 Subpart H, Part 24 Subpart E |
| Modifications on the Equipment to Achieve<br>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 Suntech International Ltd., Model ST3500 (referred to as the EUT in this report) is a Tracking Device. The product specification described herein was obtained from product data sheet or user's manual.

|   |                 |           |                           |
|---|-----------------|-----------|---------------------------|
| DEVICE TYPE   | Tracking Device |           |                           |
| OPERATING FREQUENCY                                   | WCDMA Band 2    | TX        | 1 852.4 MHz ~ 1 907.6 MHz |
|   |                 | RX        | 1 932.4 MHz ~ 1 987.6 MHz |
|   | WCDMA Band 5    | TX        | 826.4 MHz ~ 846.6 MHz     |
|   |                 | RX        | 871.4 MHz ~ 891.6 MHz     |
| Modulation Type                                       | QPSK, 16QAM     |           |                           |
| Maximum EIRP Power                                    | WCDMA Band 2    | 20.63 dBm |                           |
| Maximum ERP Power                                     | WCDMA Band 5    | 21.55 dBm |                           |
| ANTENNA TYPE  | PIFA Antenna    |           |                           |
| ANTENNA GAIN  | WCDMA Band 2    | 5.2 dBi   |                           |
|   | WCDMA Band 5    | 0.0 dBi   |                           |
| List of each Osc. or crystal<br>Freq.(Freq. >= 1 MHz) | 26 MHz          |           |                           |

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

-. None

## 3. EUT MODIFICATIONS

-. None

## 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  $f/1500 \text{ mW/cm}^2$  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  $P (\text{mW}) = P (\text{W}) / 1 000$ ,  $d (\text{cm}) = 0.01 * d (\text{m})$

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

Where

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

### IMPORTANT NOTE:

To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device. There is no simultaneous operation within the bands used in this EUT

## 4.2 EUT Description

| Kind of EUT                    | Tracking Device  |           |                           |
|--------------------------------|--|-----------|---------------------------|
| Operating Frequency Band       | WCDMA Band 2   | TX        | 1 852.4 MHz ~ 1 907.6 MHz |
|                                |  | RX        | 1 932.4 MHz ~ 1 987.6 MHz |
|                                | WCDMA Band 5   | TX        | 826.4 MHz ~ 846.6 MHz     |
|                                |  | RX        | 871.4 MHz ~ 891.6 MHz     |
| MAX. RF OUTPUT POWER           | WCDMA Band 2   | 21.29 dBm |                           |
|                                | WCDMA Band 5   | 23.16 dBm |                           |
| Antenna Gain                   | WCDMA Band 2   | 5.2 dBi   |                           |
|                                | WCDMA Band 5   | 0.0 dBi   |                           |
| Exposure<br>Evaluation Applied | <div><input checked="" type="checkbox"/> MPE</div> <div><input type="checkbox"/> SAR</div> <div><input type="checkbox"/> N/A</div> |           |                           |

## 5 Evaluation Results

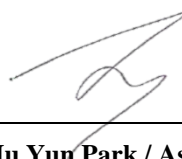
### 5.1 Assessment result of RF Power and Antenna gain

#### 5.1.1 WCDMA Band 2

| Operating Mode | Operating Frequency (MHz) | Avg. Power Level |       |
|----------------|---------------------------|------------------|-------|
|                |                           | (dBm)            | (W)   |
| WCDMA Band 2   | 1 852.4                   | 21.29            | 0.135 |

#### 5.1.2 WCDMA Band 5

| Operating Mode | Operating Frequency (MHz) | Avg. Power Level |       |
|----------------|---------------------------|------------------|-------|
|                |                           | (dBm)            | (W)   |
| WCDMA Band 5   | 836.6                     | 23.16            | 0.207 |



Tested by: Ju Yun Park / Assistant Manager



### 5.1.3 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

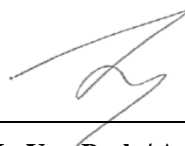
| Operating Mode | Operating Frequency (MHz) | Conducted Average Power |        | Antenna Gain (dBi) |        | Safe Distance (cm) | Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation | Limit (mW/cm <sup>2</sup> ) |
|----------------|---------------------------|-------------------------|--------|--------------------|--------|--------------------|--|-----------------------------|
|                |                           | (dBm)                   | (mW)   | Log                | Linear |                    |  |                             |
| WCDMA Band 2   | 1 852.4                   | 21.29                   | 134.59 | 5.20               | 3.311  | 5.95               | 0.088 7  | 1.00                        |

| Operating Mode | Operating Frequency (MHz) | Conducted Average Power |        | Antenna Gain (dBi) |        | Safe Distance (cm) | Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation | Limit (mW/cm <sup>2</sup> ) |
|----------------|---------------------------|-------------------------|--------|--------------------|--------|--------------------|--|-----------------------------|
|                |                           | (dBm)                   | (mW)   | Log                | Linear |                    |  |                             |
| WCDMA Band 5   | 836.6                     | 23.16                   | 207.01 | 0.00               | 1.000  | 4.06               | 0.041 2  | 0.55                        |

$$\text{limit} = 836.6/1500 = 0.55 \text{ mW/cm}^2$$

$$\begin{aligned} \text{WCDMA Band 2 Power Density} &= \text{Conducted Average Power} * \text{Antenna Gain(dBi)} / (4\pi R^2) \\ &= (134.59 * 3.311) / (4 * \pi * 20^2) = 0.088 7 \text{ mW/cm}^2 \end{aligned}$$

$$\begin{aligned} \text{WCDMA Band 5 Power Density} &= \text{Conducted Average Power} * \text{Antenna Gain(dBd)} / (4\pi R^2) \\ &= (207.01 * 1.000) / (4 * \pi * 20^2) = 0.041 2 \text{ mW/cm}^2 \end{aligned}$$



Tested by: Ju Yun Park / Assistant Manager