ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR TRANSMITTER

Test Report No.	**: OT-189-RWD-020**
AGR No.	**: A187A-290**
Applicant	**: Suntech International Ltd.**
Address	**: (Gasan-dong, Greatvally), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea**
Manufacturer	**: Suntech International Ltd.**
Address	**: (Gasan-dong, Greatvally), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea**
Type of Equipment	**: Tracking Device**
FCC ID.	**: WA2ST4300**
Model Name	**: ST4300**
Serial number	**: N/A**
Total page of Report	**: 11 pages (including this page)**
Date of Incoming	**: July 20, 2018**
Date of issue	**: September 16, 2018**

SUMMARY

The equipment complies with the regulation; ***FCC PART*** **Part 2, Part 22 Subpart H, Part 24 Subpart E, Part 27 Subpart C** 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: Jae-Ho Lee / Chief Engineer
ONETECH Corp.

Approved by: Keun-Young, Choi / Vice President
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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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-189-RWD-020	September 16, 2018	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : Suntech International Ltd.
Address : (Gasan-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 : WA2ST4300
Model Name : ST4300
Serial Number : N/A
Date : September 16, 2018

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 AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART Part 2, Part 22 Subpart H, Part 24 Subpart E, Part 27 Subpart C
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 Suntech International Ltd., Model ST4300 (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	LTE Band 2	TX	1 850 MHz ~ 1 910 MHz
		RX	1 930 MHz ~ 1 990 MHz
	LTE Band 4	TX	1 710 MHz ~ 1 755 MHz
		RX	2 110 MHz ~ 2 155 MHz
	LTE Band 5	TX	824 MHz ~ 849 MHz
		RX	869 MHz ~ 894 MHz
	LTE Band 12	TX	699 MHz ~ 716 MHz
		RX	729 MHz ~ 746 MHz
	LTE Band 13	TX	777 MHz ~ 787 MHz
		RX	746 MHz ~ 756 MHz
LTE Channel Bandwidth	10 MHz		
Modulation Type	QPSK, 16QAM		
Maximum EIRP Power	LTE Band 2	20.91 dBm	
	LTE Band 4	20.48 dBm	
Maximum ERP Power	LTE Band 5	21.16 dBm	
	LTE Band 12	19.75 dBm	
	LTE Band 13	19.39 dBm	
ANTENNA TYPE	PIFA Antenna		
ANTENNA GAIN	LTE Band 2	1.50 dBi	
	LTE Band 4	1.47 dBi	
	LTE Band 5	0.74 dBi	
	LTE Band 12	-0.84 dBi	
	LTE Band 13	0.52 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	26 MHz		

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

-. None

3. EUT MODIFICATIONS

-. None

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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 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

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 ant 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

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4.2 EUT Description

Kind of EUT	Tracking Device		
Operating Frequency Band	LTE Band 2	TX	1 850 MHz ~ 1 910 MHz
		RX	1 930 MHz ~ 1 990 MHz
	LTE Band 4	TX	1 710 MHz ~ 1 755 MHz
		RX	2 110 MHz ~ 2 155 MHz
	LTE Band 5	TX	824 MHz ~ 849 MHz
		RX	869 MHz ~ 894 MHz
	LTE Band 12	TX	699 MHz ~ 716 MHz
		RX	729 MHz ~ 746 MHz
	LTE Band 13	TX	777 MHz ~ 787 MHz
		RX	746 MHz ~ 756 MHz
MAX. RF OUTPUT POWER	LTE Band 2	22.05 dBm	
	LTE Band 4	22.17 dBm	
	LTE Band 5	23.29 dBm	
	LTE Band 12	22.84 dBm	
	LTE Band 13	23.26 dBm	
Antenna Gain	LTE Band 2	1.50 dBi	
	LTE Band 4	1.47 dBi	
	LTE Band 5	0.74 dBi	
	LTE Band 12	-0.84 dBi	
	LTE Band 13	0.52 dBi	
Exposure Evaluation Applied	■ MPE ☐ SAR ☐ N/A		

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5 Evaluation Results

5.1 Assessment result of RF Power and Antenna gain

5.1.1 LTE Band 2

Operating Mode	Operating Frequency (MHz)	Avg. Power Level (dBm)	Avg. Power Level (W)
LTE Band 2	1 905	22.05	0.160

5.1.2 LTE Band 4

Operating Mode	Operating Frequency (MHz)	Avg. Power Level (dBm)	Avg. Power Level (W)
LTE Band 4	1 715	22.17	0.165

5.1.3 LTE Band 5

Operating Mode	Operating Frequency (MHz)	Avg. Power Level (dBm)	Avg. Power Level (W)
LTE Band 5	829	23.29	0.213

5.1.4 LTE Band 12

Operating Mode	Operating Frequency (MHz)	Avg. Power Level (dBm)	Avg. Power Level (W)
LTE Band 12	704	22.84	0.192

5.1.5 LTE Band 13

Operating Mode	Operating Frequency (MHz)	Avg. Power Level (dBm)	Avg. Power Level (W)
LTE Band 13	782	23.26	0.212

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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/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(mW)	Log	Linear			
LTE Band 2	1 905	22.05	160.32	1.50	1.413	4.24	0.045 1	1.00
LTE Band 4	1 715	22.17	164.82	1.47	1.403	4.29	0.046 0	1.00

Operating Mode	Operating Frequency (MHz)	Conducted Average Power		Antenna Gain (dBd)		Safe Distance (cm)	Power Density (mW/cm²) @ 20 cm Separation	Limit (mW/cm²)
		(dBm)	(mW)	Log	Linear			
LTE Band 5	829	23.29	213.30	-1.41	0.723	3.50	0.030 7	0.55
LTE Band 12	704	22.84	192.31	-2.99	0.502	2.77	0.019 2	0.46
LTE Band 13	782	23.26	211.84	-1.63	0.687	3.40	0.029 0	0.52

limit = 829/1500 = 0.55 mW/cm²

limit = 704/1500 = 0.46 mW/cm²

limit = 782/1500 = 0.52 mW/cm²

LTE Band 2 Power Density = Conducted Average Power * Antenna Gain(dBi) / (4πR²)

= (160.32*1.413)/(4*π*20²) = 0.045 1 mW/cm²

LTE Band 4 Power Density = Conducted Average Power * Antenna Gain(dBi) / (4πR²)

= (164.82*1.403)/(4*π*20²) = 0.046 0 mW/cm²

LTE Band 5 Power Density = Conducted Average Power * Antenna Gain(dBd) / (4πR²)

= (213.30*0.723)/(4*π*20²) = 0.030 7 mW/cm²

LTE Band 12 Power Density = Conducted Average Power * Antenna Gain(dBd) / (4πR²)

= (192.31*0.502)/(4*π*20²) = 0.019 2 mW/cm²

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LTE Band 13 Power Density = Conducted Average Power * Antenna Gain(dBd) / ($4\pi R^2$)

= (211.84*0.687)/(4*π*20^2) = 0.029 0 mW/cm^2

Tested by: Ju Yun Park / Assistant Manager

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