

FCC TEST REPORT

Job No. : GPEM2109000452EC

Applicant Name : Suntech International Ltd.

Equipment Under Test (EUT) :

Product Name : Tracking Device

Model Name : ST4315

FCC Authorization Type : Certification

Applied Standards : FCC Part 15 Subpart B, Class B
ANSI C63.4a:2017

Date of Receipt : September 3, 2021

Date of Test : September 15, 2021

Date of Issue : October 7, 2021

Test Results : Complied

Tested by :

Ethan Baek

Reviewed by :

Paul Kang

This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

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The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full

Contents

1. General Information.....	4
1.1 Client Information.....	4
1.2 Test Laboratory.....	4
1.3 General Information of E.U.T.	4
1.4 Operating Modes and Conditions.....	4
1.5 Peripheral Equipments.....	4
1.6 Cable List.....	4
1.7 System Configurations.....	5
1.8 Test System Layout	5
1.9 Modifications/Notes.....	5
1.10 Applicable Standards for Testing	5
1.11 Summary of Test Results.....	5
2. Emission Test.....	6
2.1 Test Results.....	6
2.2 Test Method and Limits.....	6
2.2.1 Test Method	6
2.2.2 Test Limits.....	6
2.3 Radiated Emission	7
2.3.1 Test Equipments	7
2.3.2 Test Site.....	7
2.3.3 Environment Conditions	7
2.3.4 Test Results.....	8
Appendix A : Measurement Uncertainty	10

Revision History

Revision	Report number	Description
0	F690501-RF-EMC000128	Initial
1	F690501-RF-EMC000128_1	Revision for 1.7 System Configurations, 1.8 Test System Layout and 1.9 Modifications/Notes

1. General Information

1.1 Client Information

Applicant	Suntech International Ltd.
Applicant Address	A-1705, 1706, Greatvalley, 32, Digital-ro 9-gil, Geumcheon-gu, Seoul, Republic of Korea, 08512
Manufacturer	Suntech International Ltd.
Manufacturer Address	A-1705, 1706, Greatvalley, 32, Digital-ro 9-gil, Geumcheon-gu, Seoul, Republic of Korea, 08512

1.2 Test Laboratory

Name and Address	SGS Korea Co., Ltd.
- Giheung 1 Laboratory	35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
- Giheung 2 Laboratory	23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
FCC Registration No.	KR0150
IC Registration No.	7837B
Phone	+ 82 31 548 0710
Fax	+ 82 31 548 0719
e-mail	julia.choi@sgs.com

1.3 General Information of E.U.T.

Classification	Specification
Product Name	Tracking Device
Model Name	ST4315
EMI Classification	Class B
Internal Clock Frequency	1.5 GHz
Port	Micro 5 pin(Inside), DC IN
Function	GPS Tracking device

1.4 Operating Modes and Conditions

Operating mode	Operating Condition
1) Charge + Operating	A state that the EUT was being charged through the car battery and GPS enabled communicating with the notebook computer.

1.5 Peripheral Equipments

Description	Model	Serial No.	Manufacturer
Notebook computer	Probook	5CG5114KJ5	HP
Car Battery	GB40R	-	SEBANG

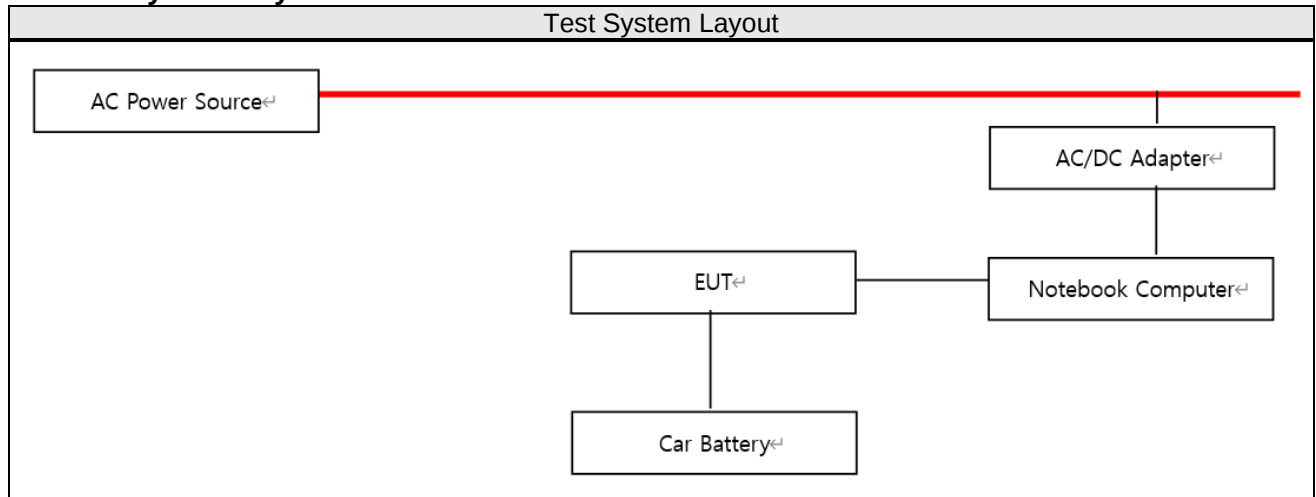
1.6 Cable List

Start		END		Cable Spec.		Used core
Name	I/O Port	Name	I/O Port	Length (m)	Shield	
EUT	Micro 5 pin(inside)	Notebook computer	USB	1.0	Unshield	No
	DC IN	Car Battery	-	1.0	Unshield	No
Notebook computer	DC IN	AC/DC Adapter	DC OUT	1.0	Unshield	No
AC/DC Adapter	AC IN	AC Power Source	-	1.5	Unshield	No

1.7 System Configurations

Description	Model	Serial No.	Manufacturer	Note
Main Board	ST4310_Rev02	-	-	-
Battery	YI302631H	PD2103	UNISOLUTION	-
LTE Module	BG95-M3	P1C20HQ06013552	QUECTEL	FCC ID : XMR201910BG95M3
GPS Module	MT2503	-	-	-

1.8 Test System Layout



1.9 Modifications/Notes

- There was no modified item during the test.
- EUT is excluded from conducted emissions test because it uses DC power.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
FCC Part 15 : Subpart B	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109	Complied

Note : Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Standards	Test Results
Conducted Emission	FCC Part 15 Subpart B Section 15.107	N/A
Radiated Emission	FCC Part 15 Subpart B Section 15.109	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m & 3 m
	Above 1 GHz	1 MHz	3 m

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

2.2.2 Test Limits

-Conducted Emission Limits

Frequency Range	Limits(dB μ V)		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB μ V/m)	Class
	Quasi-peak	
30 MHz ~ 88 MHz	39.0	Class A (10 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.4	
960 MHz ~ 1 GHz	49.5	
30 MHz ~ 88 MHz	40.0	Class B (3 m method)
88 MHz ~ 216 MHz	43.5	
216 MHz ~ 960 MHz	46.0	
960 MHz ~ 1 GHz	54.0	

-Radiated Emission Limits above 1 GHz (3 m method)

Frequency Range	Limits(dB μ V/m)		Class
	Average	Peak	
Above 1 GHz	59.5	79.5	Class A
Above 1 GHz	54.0	74.0	Class B

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

2.3 Radiated Emission

The initial preliminary exploratory scans were performed over the measuring frequency range (30 MHz to 13 GHz) using a max hold mode incorporating a Peak detector by using the EMI measuring software. The final test data was measured using a Quasi-Peak detector below 1 GHz, Peak and CISPR-Average detector above 1 GHz. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

Note. Measuring software

- Giheung 1Lab. : EMC32(V9.26.01) from R&S
- Giheung 2Lab. : EMC32(V10.40.10) from R&S

2.3.1 Test Equipments

Equipment	Model	Manufacturer	Serial No	Cal Due. Date
EMI TEST RECEIVER	ESU26	R&S	100570	2022.02.24
Hybrid ANTENNA	VULB 9163	SCHWARZBECK	9163-390	2022.02.15
Double Ridged Horn Antenna	HF907	R&S	102578	2022.04.15
Low Noise Amplifier	TK-PA01S	200110-L	TESTEK	2022.06.21
Microwave Preamplifier	PAM-118A	Com-Power	551074	2021.10.13
RF Cable	EMH-2Lab-RE-01	-	-	2022.01.26
RF Cable	EMH-2Lab-RE-02	-	-	2022.01.26
RF Cable	EMH-2Lab-RE-06	-	-	2022.01.26
RF Cable	EMH-2Lab-RE-07	-	-	2022.01.26

2.3.2 Test Site

3m SEMI-ANECHOIC CHAMBER in Giheung 2 Laboratory

2.3.3 Environment Conditions

① Below 1 GHz

Temperature	(Minimum 21.0, Maximum 22.0) °C
Humidity	(Minimum 44.0, Maximum 45.0) % R.H..
Atmospheric Pressure	(Minimum 101.3, Maximum 101.3) kPa
Test Date	September 15, 2021

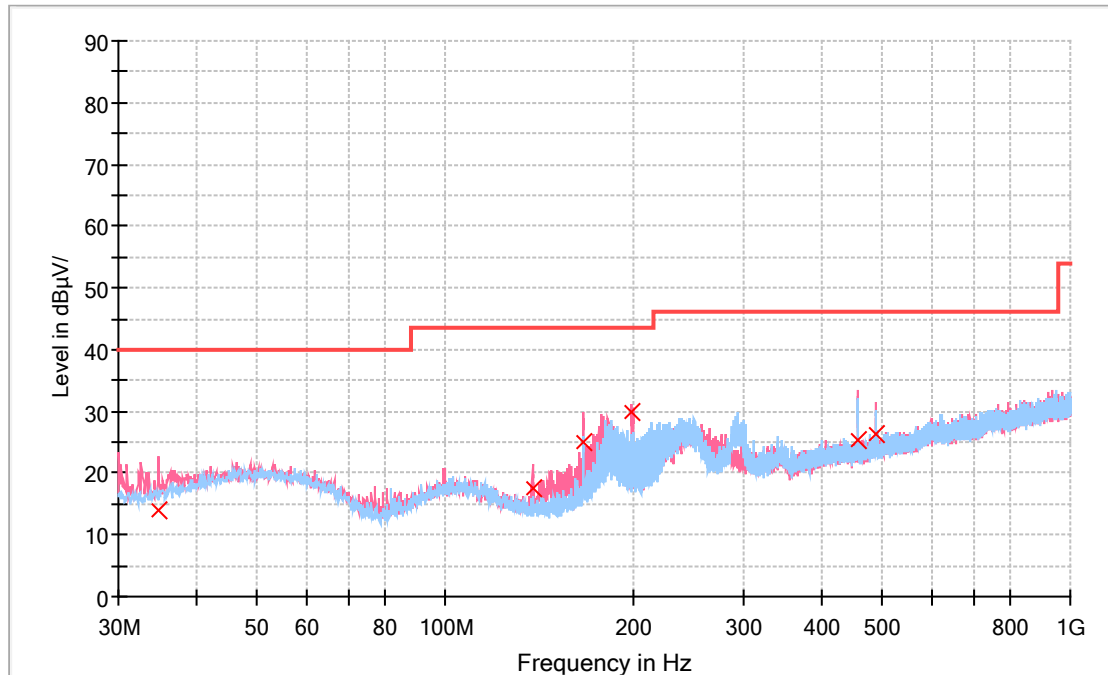
② Above 1 GHz

Temperature	(Minimum 21.0, Maximum 22.0) °C
Humidity	(Minimum 44.0, Maximum 45.0) % R.H..
Atmospheric Pressure	(Minimum 101.3, Maximum 101.3) kPa
Test Date	September 15, 2021

2.3.4 Test Results

① Below 1 GHz (3 m method)

● Test Mode: 1)



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.753	14.11	40.00	25.89	15 000.0	120.000	100.0	V	313.0	-20.6
137.864	17.55	43.50	25.95	15 000.0	120.000	100.0	V	150.0	-23.0
165.897	24.89	43.50	18.61	15 000.0	120.000	100.0	V	7.0	-22.0
199.168	29.82	43.50	13.68	15 000.0	120.000	100.0	V	7.0	-19.1
457.964	25.24	46.00	20.76	15 000.0	120.000	200.0	V	0.0	-13.2
489.489	26.35	46.00	19.65	15 000.0	120.000	400.0	V	86.0	-12.3

Measurement Uncertainty : See Appendix A

Note : ● POL H = Horizontal

● Margin = Limit – Quasi Peak

● POL V = Vertical

● Corr. = Antenna Factor + Cable loss – Amplifier Gain

Ex) In case

Freq ; 100 MHz, level ; 30 dB(μV/m), AF ; 10 dB/m, CL ; 4 dB, Amp ; 25 dB

Result = Level + AF + CL – Amp

= 30 + 10 + 4 - 25

= 19

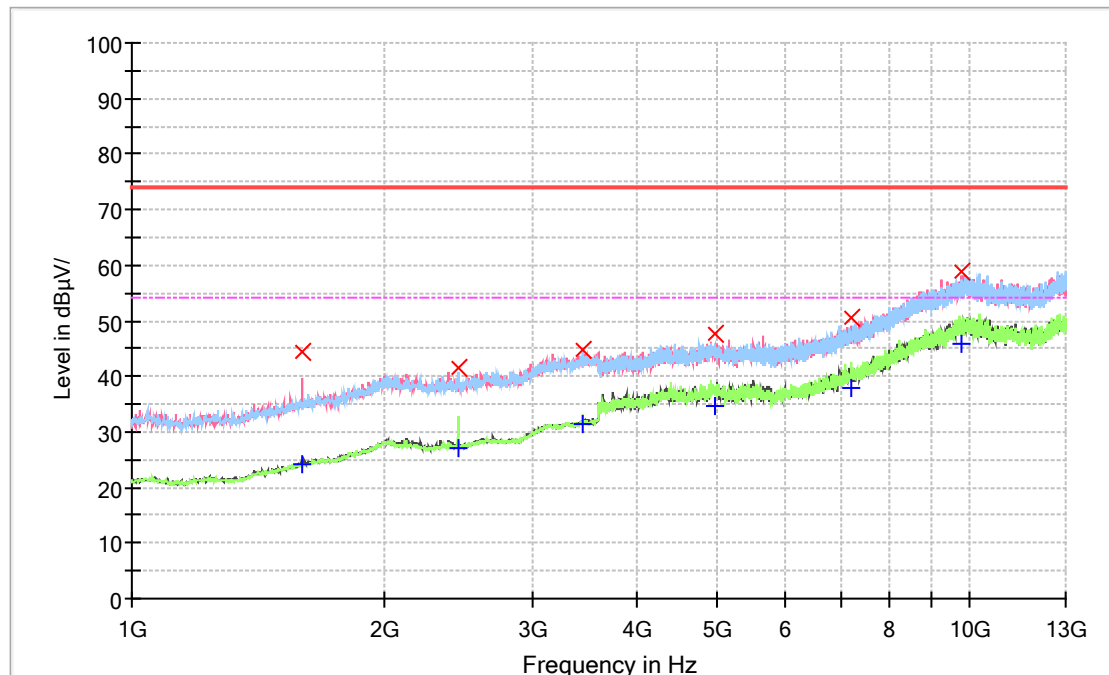
Margin = Limit – Result

= 43.5 – 19

= 24.5

② Above 1 GHz (3 m method)

- Test Mode : 1)



Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1 596.700	44.30	---	74.00	29.70	15 000.0	1 000.000	100.0	V	0.0	-10.6
1 596.700	---	24.09	54.00	29.91	15 000.0	1 000.000	100.0	V	0.0	-10.6
2 453.500	41.64	---	74.00	32.36	15 000.0	1 000.000	200.0	H	216.0	-7.9
2 453.500	---	27.18	54.00	26.82	15 000.0	1 000.000	200.0	H	216.0	-7.9
3 442.900	---	31.24	54.00	22.76	15 000.0	1 000.000	100.0	H	0.0	-4.1
3 442.900	44.85	---	74.00	29.15	15 000.0	1 000.000	100.0	H	0.0	-4.1
4 969.500	---	34.78	54.00	19.22	15 000.0	1 000.000	100.0	H	205.0	0.1
4 969.500	47.82	---	74.00	26.19	15 000.0	1 000.000	100.0	H	205.0	0.1
7 199.900	50.49	---	74.00	23.51	15 000.0	1 000.000	100.0	V	87.0	4.2
7 199.900	---	37.73	54.00	16.27	15 000.0	1 000.000	100.0	V	87.0	4.2
9 785.600	58.84	---	74.00	15.16	15 000.0	1 000.000	100.0	V	0.0	11.9
9 785.600	---	45.91	54.00	8.09	15 000.0	1 000.000	100.0	V	0.0	11.9

Measurement Uncertainty : See Appendix A

- Note :
- AF = Antenna Factor
 - POL H = Horizontal
 - H = Height
 - CL = Cable Loss
 - POL V = Vertical
 - Margin = Limit – Result
 - AMP = Amplifier Gain
 - A = Angle
 - Result = Level + AF + CL – AMP

Appendix A : Measurement Uncertainty

- Giheung 1 Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	3.70 dB (The confidential level is 95 %, k=2)
		ESH2-Z5	3.58 dB (The confidential level is 95 %, k=2)
		ESH3-Z6	3.54 dB (The confidential level is 95 %, k=2)
Conducted Emission - Signal		ISN T800	5.12 dB (The confidential level is 95 %, k=2)
		ISNT8-Cat6	5.14 dB (The confidential level is 95 %, k=2)
		ISN S751	5.20 dB (The confidential level is 95 %, k=2)
Radiated Emission	9 kHz ~30 MHz (3m chamber)	Horizontal	3.64 dB (The confidential level is 95 %, k=2)
		Vertical	3.64 dB (The confidential level is 95 %, k=2)
	30 MHz ~ 1 000 MHz (10m chamber)	Horizontal	4.26 dB (The confidential level is 95 %, k=2)
		Vertical	4.39 dB (The confidential level is 95 %, k=2)
	1 GHz ~ 18 GHz (3m chamber)	Horizontal	3.59 dB (The confidential level is 95 %, k=2)
		Vertical	3.59 dB (The confidential level is 95 %, k=2)
Radiated Immunity Test		0.86 dB (The confidential level is 95 %, k=2)	
Conducted Immunity Test		2.23 dB (The confidential level is 95 %, k=2)	
Magnetic Field		5.78 dB (The confidential level is 95 %, k=2)	

- Giheung 2 Laboratory

Test Method		Measurement Uncertainty	
Conducted Emission		ENV216	3.54 dB (The confidential level is 95 %, k=2)
		ESH2-Z5	3.53 dB (The confidential level is 95 %, k=2)
		ESH3-Z6	3.49 dB (The confidential level is 95 %, k=2)
Conducted Emission - Signal		ISN T800	5.03 dB (The confidential level is 95 %, k=2)
		ISNT8-Cat6	5.15 dB (The confidential level is 95 %, k=2)
		ISN S751	5.15 dB (The confidential level is 95 %, k=2)
Discontinuous		3.02 dB (The confidential level is 95 %, k=2)	
Disturbance Power		3.66 dB (The confidential level is 95 %, k=2)	
Radiated Emission	9 kHz ~30 MHz (3m chamber)	Horizontal	3.84 dB (The confidential level is 95 %, k=2)
		Vertical	3.84 dB (The confidential level is 95 %, k=2)
	30 MHz ~ 1 000 MHz (10m chamber)	Horizontal	5.18 dB (The confidential level is 95 %, k=2)
		Vertical	5.32 dB (The confidential level is 95 %, k=2)
	1 GHz ~ 18 GHz (3m chamber)	Horizontal	3.62 dB (The confidential level is 95 %, k=2)
		Vertical	3.67 dB (The confidential level is 95 %, k=2)
Radiated Immunity Test		1.47 dB (The confidential level is 95 %, k=2)	
Conducted Immunity Test		2.23 dB (The confidential level is 95 %, k=2)	
Magnetic Field		5.78 dB (The confidential level is 95 %, k=2)	

- End of Test Report -