FCC 47 CFR PART 15 SUBPART B

TEST REPORT

Test Report No.	**: OT-193-RED-106**
AGR No.	**: A192A-044**
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	**: ELD Device**
Model Name	**: ST25T**
FCC ID.	**: WA2ST25T**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 13 pages (including this page)**
Date of Incoming	**: February 20, 2019**
Date of Issuing	**: March 20, 2019**

SUMMARY

The equipment complies with the requirement of ***FCC CFR 47 PART 15 SUBPART B, Section 15.101.***

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

It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by: Young-Ki, Kim / Senior Engineer
ONETECH Corp.

Approved by: Eung-Chan, Kim / Chief Engineer
ONETECH Corp.

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Revision History

Rev. No.	Issued Report No.	Issued Date	Revisions	Section Affected
0	OT-193-RED-106	March 20, 2019	Initial Issue	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

-. Manufacturer : Suntech International Ltd.

-. Address : (Gasan-dong, Greatvally), B-1506, 32, Digital-ro9-gil, Geumchon-gu, Seoul, Korea

-. Manufacturer : HYUN TECK CNI.Co.Ltd

-. Address : #3F, Dongwon Techno park, 39, Sewolcheon-no 30beon-gil, Bupyeong-gu, Incheon, Korea

-. Model Name : ST25T

-. Serial Number : N/A

-. Brand/Trade Name : N/A

-. Date : March 20, 2019

EQUIPMENT CLASS	Class A Digital Device
E.U.T. DESCRIPTION	ELD Device
MEASUREMENT PROCEDURES	ANSI C63.4: 2014
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
STANDARDS	FCC PART 15, SECTION 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 m, semi anechoic chamber

ONETECH Corp. tested the above equipment in accordance with the requirements set forth in the above standard. The test results show that equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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2. TEST FACILITY

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at:

1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

2) 12-5, Jinsaegol-gil 75 beon-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666/ T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

These measurement tests were conducted at Onetech Corp.

The 10 m semi anechoic chamber and conducted measurement facilities are located on at 12-5, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

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3. TEST SUMMARY

3.1 Test standards and results

STANDARDS		RESULTS
15.107	Conducted Emission Limits	N/A (Note.1)
15.109	Radiated Emission Limits	Met the Limit / PASS

Note 1. This test was not performed the because of the EUT is DC product.

4. PRODUCT INFORMATION

4.1 Description of EUT

The Suntech International Ltd., Model ST25T (referred to as the EUT in this report) is an ELD Device. Product specification described herein was obtained from product data sheet or user's manual.

Chassis Type	Plastic
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)	48 MHz, 32.768 kHz, 16 MHz
Number of Layer	4 Layers
ELECTRICAL RATING	DC 5 V
EXTERNAL CONNECTOR	DC IN(PWR(+)/GND(-)), RS 232 TX2/RX2, RS 485 TX/RX (Service ports: OUT, ADC/IN1, ADC/IN2, RS 232 RX1/TX1, RS 232 RX3/TX3)

4.2 Model Differences

-. The following lists consist of the added model and their differences.: None

4.3 Support Equipment

The model numbers for all the equipment that were used in the tested system is:

Model	Manufacturer	Description	Connected to
ST25T	Suntech International Ltd.	ELD Device (EUT)	RS 232, RS 485
FA90PE1-00	FLEXTRONICS SALES&MARKETING(A-P) LTD.	ADAPTER	Notebook PC
E6510	DELL	Notebook PC	RS 232, RS 485, ADAPTER
N/A	N/A	RS 232	Notebook PC, EUT
N/A	N/A	RS 485	Notebook PC, EUT

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4.4 System Configuration

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
ELD Device	Suntech International Ltd.	ST25T	-

4.5 Cable Description for the EUT

Port name	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
DC IN	N	N	N	1.0	LISN
RS 232 TX2/RX2	N	N	N	0.2	RS 232
RS 485 TX/RX	N	N	N	0.6	RS 485

4.6 Equipment Modifications

-. None

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5. DESCRIPTION OF TESTS

5.1 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2014. Radiated testing was performed at a distance of 10 m from EUT to the antenna.

5.2 Test Condition

The test conditions of the noted test mode(s) in this test report are;

-. The equipment under test is the ELD Device, RS 232 and RS 485 connected to this device were connected to a laptop PC to check the status of each serial communication using programs installed on the PC.

-. Test Voltage / Frequency: DC 5 V

-. Test Mode(s)

Operating Mode 1	RS232/RS485 serial communication mode

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5.3 Conducted Emission

The EUT was placed on a non-conductive 2.5 m × 1.5 m table, which is 0.8 m in height above the reference ground plane and 0.4 m away from the vertical conducting plane (over 2 m × 2 m) that is bonded to the reference ground plane.

The power of EUT is fed through a 50 Ω/ 50 μH + 5 Ω LISN and all support equipment is powered from another LISN. Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver.

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and CISPR-Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

5.4 Radiated Emission

Exploratory Radiated measurements were conducted at the 3 m semi anechoic chamber in order to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Final measurements were made at 10 m semi anechoic chamber that complies with CISPR 16/ANSI C63.4.

Exploratory measurements were scanned using Peak mode of EMI Test receiver and final measurements were measured with Quasi-Peak mode (Below 1 GHz) and Peak & CISPR-Average mode (Above 1 GHz).

The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

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6. FINAL RESULT OF MEASUREMENT

Exploratory measurement was done in normal operation mode. And the final measurement was selected for the maximized emission level.

6.1 Radiated Emission Test

6.1.1 Operating Environment

Temperature : 24.2 °C

Relative humidity : 51.4 % R.H.

6.1.2 Test Setup

The radiated emissions measurements were on the 10 m, in 10 m semi anechoic chamber. The photocopier that the EUT has been inserted in was placed on an insulator above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.1.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.36 dB

Radiated emission electric field intensity, 300 MHz ~ 1 000 MHz : ± 4.36 dB

Radiated emission electric field intensity, 1 000 MHz ~ 18 000 MHz : ± 5.14 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

6.1.4 Limit

Frequency of Emission (MHz)	Resolution bandwidth	Field strength @ 10 m (dBμV/m)
		Quasi-peak
30 ~ 230	120 kHz	40.0
230 ~ 1 000		47.0

6.1.5 Test Equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESU	Rohde & Schwarz	Test Receiver	100261	Mar. 29, 2018 (1Y)
■ -	VULB9163	Schwarzbeck	Trilog Broadband Antenna	9163-225	Sep. 17, 2018 (2Y)
□ -	3115	ETS-LINDGREN	Horn Antenna	34823	Sep. 10, 2018 (2Y)
■ -	8447D	Hewlett Packard	Amplifier	2944A07777	Mar. 29, 2018 (1Y)
□ -	BBV9718	Schwarzbeck	Amplifier	310	Mar. 30, 2018 (1Y)
■ -	CO3000	Innco Systems GmbH	Controller	CO3000/1015	N/A
■ -	DT5000	Innco Systems GmbH	Turn Table	DT5000/3t	N/A
■ -	MA4000-EP	Innco Systems GmbH	Antenna Master	MA4000/508	N/A
□ -	MA4640-XPET	Innco Systems GmbH	Antenna Master	MA4640/592	N/A

All test equipment used is calibrated on a regular basis.

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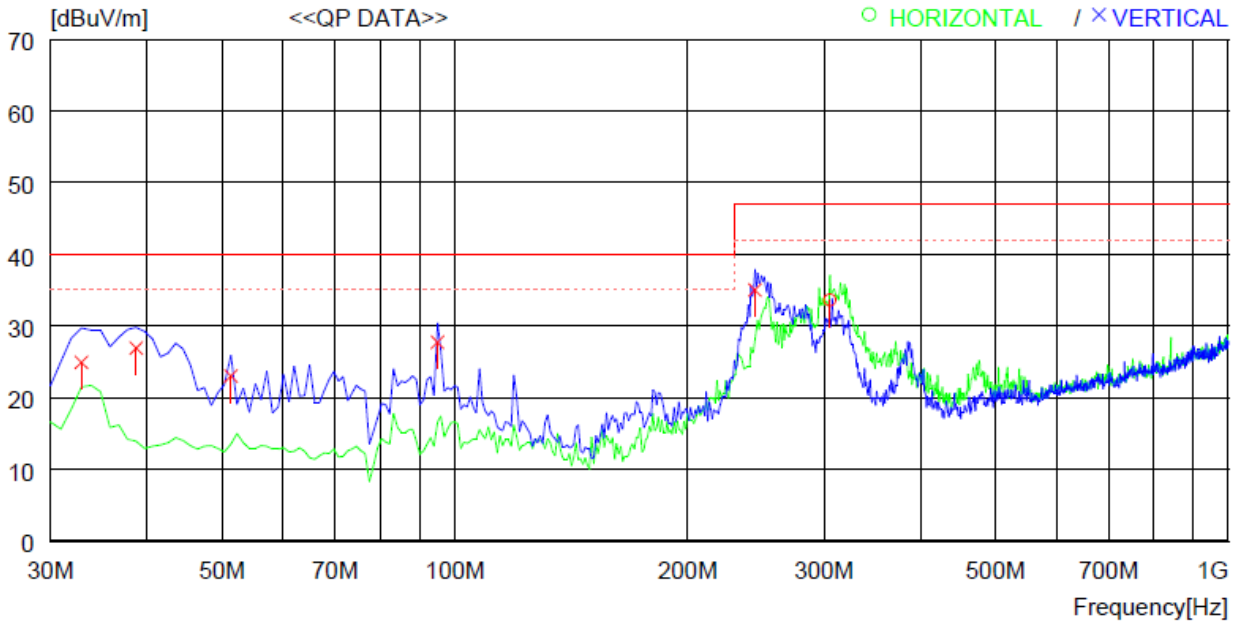
6.1.6 Test Data

-. Test Result : Pass

Tested by: Ji-Hwan, Jang / Project Engineer

Operating Mode 1			
Frequency range	: 30 MHz ~ 1 000 MHz	Test Date	: March 14, 2019
Resolution bandwidth	: 120 kHz	Measurement distance	: 10 m
Detector Mode	: Quasi-Peak		



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	305.480	42.6	13.2	5.1	27.3	33.6	47.0	13.4	400	79
----- Vertical ------										
2	32.910	39.2	12.0	1.7	28.0	24.9	40.0	15.1	300	4
3	38.730	40.0	13.1	1.8	28.0	26.9	40.0	13.1	200	359
4	51.340	35.6	13.5	1.9	28.0	23.0	40.0	17.0	300	18
5	94.990	41.7	11.2	2.7	27.9	27.7	40.0	12.3	100	0
6	244.370	45.5	12.2	4.7	27.4	35.0	47.0	12.0	100	0

Remark: Margin (dB) = Limit – Result and Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

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7. SAMPLE CALCULATIONS

$$dB\mu V = 20\ Log_{10}(\mu V)$$

Margin = Limit - Result

-. Example 1: 0.15100 MHz

Class A Limit	= 66.0 dBμV (Average)
Reading	= 36.1 dBμV
Correction Factor	= Cable Loss + Pulse Limiter
	= 10.1 dB
Total	= 46.2 dBμV
Margin	= 66.0 dBμV – 46.2 dBμV
	= 19.8 dB

-. Example 2: 244.370 MHz

Class A Limit	= 47.0 dBμV/m (Quasi-peak)
Reading	= 45.5 dBμV
Correction Factor	= Antenna Factor (12.2 dB/m) + Cable Loss (4.7 dB) - Amp. Gain (27.4 dB)
	= -10.5 dB
Total	= 35.0 dBμV/m
Margin	= 47.0 dBμV/m – 35.0 dBμV/m
	= 12.0 dB

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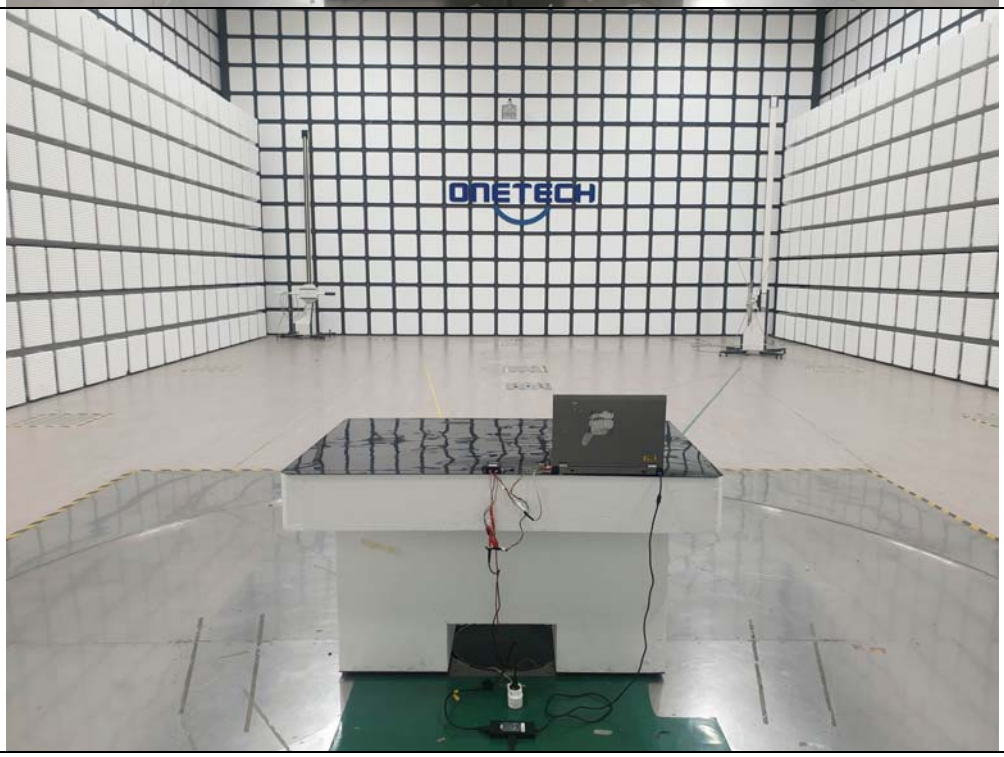
APPENDIX A

[TEST SET UP PHOTOGRAPHS]

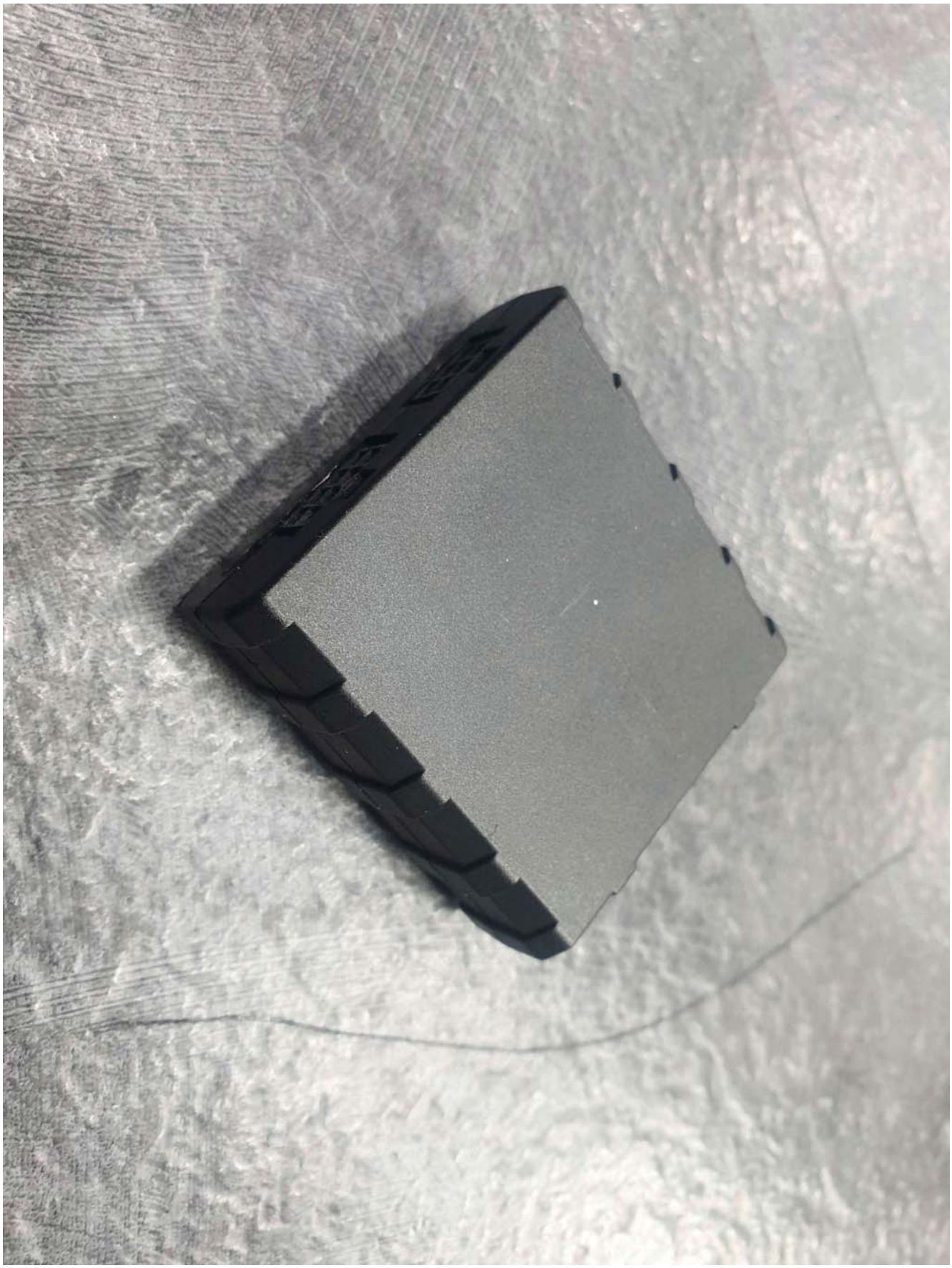
Radiated Emission Test Set Up (Below 1 GHz)



APPENDIX B

[EXTERNAL PHOTOGRAPHS]

ST25T
Made by
SUNTECH / KOREA



APPENDIX C

[INTERNAL PHOTOGRAPHS]

12
1849
94V-0
T-02

APPENDIX D

[LABELLING REQUIREMENTS]

[INFORMATION TO THE USER IN USER'S MANUAL]

LABELLING REQUIREMENTS

FCC Part 15 SUBPART B § 15.19 Labeling requirements

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or Supplier's Declaration of Conformity shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

For FCC Certification

If the device is subject to Certification: (1) Section 2.925 contains information on identification of the equipment; (2) include a label bearing an FCC Identifier (FCC ID) (Section 2.926) and (3) include the appropriate compliance statement in Section 15.19(a). If the labelling area is considered too small and therefore it is impractical (smaller than the palm of the hand) to display the compliance statement, then the statement may be placed in the user manual or product packaging. However, the device must still be labelled with the FCC ID. If the device is unquestionably too small for the FCC ID to be readable (smaller than 4-6 points), the FCC ID may be placed in the user manual. However, it must be determined that the device itself is too small – the label area allocated to the FCC ID may not be reduced because of over crowded identification of other product and regulatory information. Justification for placing the FCC ID in the manual must be submitted with the initial application for certification for review and approval.

For FCC Supplier's Declaration of Conformity (SDOC)

(a) If a product must be tested and authorized under Supplier's Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(1) Identification of the product, e.g., name and model number;

(2) A compliance statement as applicable, e.g., for devices subject to part 15 of this chapter as specified in §15.19(a)(3) of this chapter, that the product complies with the rules; and

(3) The identification, by name, address and telephone number or Internet contact information, of the responsible party, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(b) If a product is assembled from modular components (e.g., enclosures, power supplies and CPU boards) that, by themselves, are authorized under a Supplier's Declaration of Conformity and/or a grant of certification, and the assembled product is also subject to authorization under Supplier's Declaration of Conformity but, in accordance with the applicable regulations, does not require additional testing, the product shall be supplied, at the time of marketing or importation, with a compliance information statement containing the following information:

(1) Identification of the assembled product, e.g., name and model number.

(2) Identification of the modular components used in the assembly. A modular component authorized under Supplier's Declaration of Conformity shall be identified as specified in paragraph (a)(1) of this section. A modular component authorized under a grant of certification shall be identified by name and model number (if applicable) along with the FCC Identifier number.

(3) A statement that the product complies with part 15 of this chapter.

(4) The identification, by name, address and telephone number or Internet contact information, of the responsible party who assembled the product from modular components, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(5) Copies of the compliance information statements for each modular component used in the system that is authorized under Supplier's Declaration of Conformity.

(c) The compliance information statement shall be included in the user's manual or as a separate sheet. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. The information may be provided electronically as permitted in §2.935.

PROPOSED LABEL

The label included following statement will be attached on product or the compliance statement can be observed in a prominent location in the instruction manual.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INFORMATION TO THE USER IN USER'S MANUAL

For FCC: The instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

For a **Class A** digital device or peripheral

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

For a **Class B** digital device or peripheral

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one more of the following measures:

-. Reorient or relocate the receiving antenna.

-. Increase the separation between the equipment and receiver.

-. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-. Consult the dealer or an experienced radio/TV technician for help.

WARNING

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.