EMC TEST REPORT



Report No.: 15020148-FCC-E Supersede Report No.: N/A

Applicant	Jiangsu SWR Science & Technology Co.,Ltd		
Product Name	SenseDisc Data Logger		
Main Model	SD00		
Test Standard	FCC Part 15 S	Subpart B Class B:2014, ANSI C63.4: 2014	
Test Date	March 25 to A	pril 10, 2015	
Issue Date	April 15, 2014		
Test Result	Pass Fail		
Equipment complied	d with the spec	cification	
Equipment did not comply with the specification			
Deon .	Dai'	A proe Stooko	
Deon Dai Test Engineer		Herve Idoko Checked By	
This test report may be reproduced in full only			
Test result presented in this test report is applicable to the tested sample only			

Issued by:

SIEMIC (Nanjing-China) Laboratories

2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email: China@siemic.com.cn



Test Report No.	15020148-FCC-E
Page	2 of 34

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

residentiations for committy resoccoment		
Country/Region	Scope	
USA	EMC, RF/Wireless, SAR, Telecom	
Canada	EMC, RF/Wireless, SAR, Telecom	
Taiwan	EMC, RF, Telecom, SAR, Safety	
Hong Kong	RF/Wireless, SAR, Telecom	
Australia	EMC, RF, Telecom, SAR, Safety	
Korea	EMI, EMS, RF, SAR, Telecom, Safety	
Japan	EMI, RF/Wireless, SAR, Telecom	
Singapore	EMC, RF, SAR, Telecom	
Europe	EMC, RF, SAR, Telecom, Safety	



Test Report No.	15020148-FCC-E
Page	3 of 34

This page has been left blank intentionally.



Test Report No.	15020148-FCC-E
Page	4 of 34

CONTENTS

1	REPORT REVISION HISTORY	5
2.	CUSTOMER INFORMATION	5
3.	TEST SITE INFORMATION	5
4.	EQUIPMENT UNDER TEST (EUT) INFORMATION	6
5.	TEST SUMMARY	7
6.	MEASUREMENTS, EXAMINATION AND DERIVED RESULTS	8
6.1 A	C POWER LINE CONDUCTED EMISSIONS	8
6.2 F	ADIATED EMISSIONS	14
ANN	EX A. TEST INSTRUMENT	18
ANN	EX B. EUT AND TEST SETUP PHOTOGRAPHS	19
ANN	EX C. TEST SETUP AND SUPPORTING EQUIPMENT	30
ANN	EX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST	33
ANN	EX E. DECLARATION OF SIMILARITY	34



Test Report No.	15020148-FCC-E
Page	5 of 34

1. Report Revision History

Report No.	Report Version	Description	Issue Date
15020148-FCC-E	NONE	Original	April 15, 2014

2. <u>Customer information</u>

Applicant Name	Jiangsu SWR Science & Technology Co.,Ltd	
Applicant Add	NO.14 Junnong Road, Qinhuai District , Nanjing, Jiangsu Province, China	
Manufacturer	Jiangsu SWR Science & Technology Co.,Ltd	
Manufacturer Add	NO.14 Junnong Road, Qinhuai District , Nanjing, Jiangsu Province, China	

3. Test site information

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and
FCC Toot Cito No	Technology Development Park, Nanjing, China 986914
FCC Test Site No. IC Test Site No.	4842B-1
Test Software	Labview of SIEMIC version 1.0



Test Report No.	15020148-FCC-E
Page	6 of 34

Equipment under Test (EUT) Information

Description of EUT:	SenseDisc Data Logger
Jescription of Lot.	Selisebisc bala Luggei

Main Model: **SD00**

Serial Model: SD0010, SD0020, SD0030, SD0040, SD0050

Date EUT received: March 20, 2015

Test Date(s): March 25 to April 10, 2015

Antenna Gain: Bluetooth&BLE: 2 dBi

Bluetooth: GFSK&π/4-DQPSK&8DPSK Type of Modulation:

BLE: GFSK

RF Operating Frequency (ies): Bluetooth&BLE: 2402-2480 MHz(TX/RX)

Bluetooth: 79CH Number of Channels:

BLE: 40CH

Port: USB Port, Sensor Port*7

Adapter:

Model: XHY050100UCB

Input: AC 100-240V 50/60Hz 0.3A MAX Input Power:

> Output: DC 5V 1.0A Battery: 3.7V 1800mAh

Trade Name: SenseDisc

FCC ID: 2AEEJ-SD

Note: the difference between these models please refer to Annex E. DECLARATION OF SIMILARITY.



Test Report No.	15020148-FCC-E
Page	7 of 34

5. Test Summary

The product was tested in accordance with the following specifications. All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§15.107; ANSI C63.4: 2014	AC Power Line Conducted Emissions	Compliance
§15.109; ANSI C63.4: 2014	Radiated Emissions	Compliance

Measurement Uncertainty

Test Item	Description	Uncertainty
Radiated Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	3.952dB



Test Report No.	15020148-FCC-E
Page	8 of 34

6. Measurements, Examination And Derived Results

6.1 AC Power Line Conducted Emissions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	April 10, 2015
Tested By:	Deon Dai

Requirement(s):

Spec	Item	Requirement	Applicable		
47CFR§15.10 7	a)	 For Low-power radio-frequency devices that is designed to be connected to the public utility (AC) power line, the radio frequer voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 [mu]H/50 ohms line impedance stabilization network (LISN). The lower limit applies at the boundary between the frequencies ranges. Frequency ranges Limit (dBμV) (MHz) QP Average 0.15 ~ 0.5 66 – 56 56 – 46 5 ~ 30 60 50 			
Test Setup		Vertical Ground Reference Plane Horizontal Ground Reference Plane Note: 1.Support units were connected to second LISN. 2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm			
Procedure	the 3. Th filt 4. Th co 5. All 6. Th 7. A: the 8. High	 the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table. The power supply for the EUT was fed through a 50W/50mH EUT LISN, connected to filtered mains. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable. All other supporting equipment were powered separately from another main supply. The EUT was switched on and allowed to warm up to its normal operating condition. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver. High peaks, relative to the limit line, were then selected, The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz. 			



Test Report No.	15020148-FCC-E
Page	9 of 34

Remark			
Result	Pass	Fail	
Test Data	Yes	□ _{N/A}	
Test Plot	Yes	□ _{N/A}	

Data sample

Frequency (MHz)	Quasi-Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Factors (dB)
XXX	56.21	66.00	-9.79	39.20	56.00	-16.80	12.22

Frequency (MHz) = Emission frequency in MHz

Quais-Peak/Average (dBμV/m)=Receiver Reading(dBμV/m)+ Factor(dB)

 $Limit(dB\mu V/m)$ =Limit stated in standard

Factor (dB)= cable loss+ Insertion loss of LISN+ Insertion loss of transient limiter (The transient limiter included 10dB attenuation)

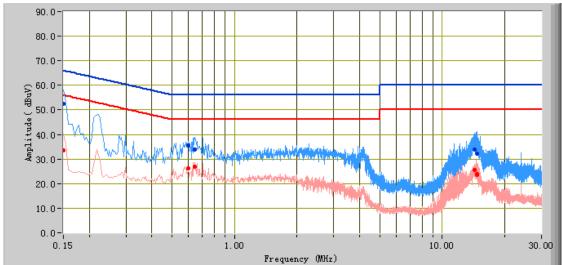
Calculation Formula:

Margin (dB)=Quasi Peak / Average (dBμV/m) – limit (dBμV/m)



Test Report No.	15020148-FCC-E
Page	10 of 34

Peak Detector Quasi Peak Limit Average Detector Average Limit



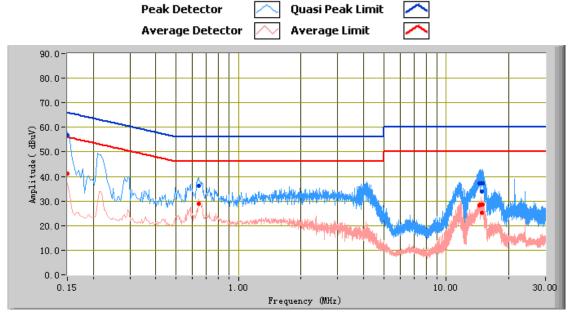
Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.15	52.56	66.00	-13.44	33.67	56.00	-22.33	12.22
0.64	33.88	56.00	-22.12	27.02	46.00	-18.98	10.97
0.60	35.41	56.00	-20.59	26.35	46.00	-19.65	11.01
14.64	32.31	60.00	-27.69	23.85	50.00	-26.15	11.39
14.73	32.33	60.00	-27.67	23.54	50.00	-26.46	11.39
14.30	33.80	60.00	-26.20	25.62	50.00	-24.38	11.37



Test Report No.	15020148-FCC-E
Page	11 of 34



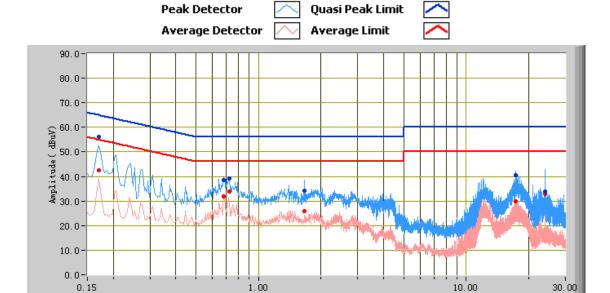
Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.15	56.72	66.00	-9.28	41.27	56.00	-14.73	12.21
0.64	36.22	56.00	-19.78	29.01	46.00	-16.99	10.96
14.95	37.06	60.00	-22.94	28.56	50.00	-21.44	11.39
14.61	37.32	60.00	-22.68	28.70	50.00	-21.30	11.37
14.41	37.18	60.00	-22.82	28.29	50.00	-21.71	11.36
14.87	33.71	60.00	-26.29	25.23	50.00	-24.77	11.38



Test Report No.	15020148-FCC-E
Page	12 of 34



Test Data

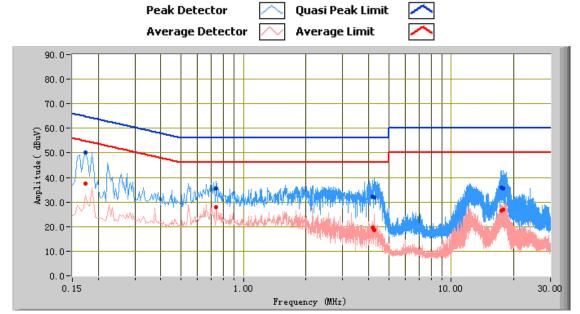
Phase Line Plot at 230Vac, 50Hz

Frequency (MHz)

	i flase Line i fot at 250 vac, 50 fiz							
Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)	
0.17	56.02	64.96	-8.94	42.40	54.96	-12.56	11.93	
0.68	38.37	56.00	-17.63	32.04	46.00	-13.96	10.94	
24.00	33.73	60.00	-26.27	32.98	50.00	-17.02	11.67	
1.67	34.13	56.00	-21.87	26.02	46.00	-19.98	10.81	
17.29	40.60	60.00	-19.40	29.83	50.00	-20.17	11.47	
0.73	39.04	56.00	-16.96	33.78	46.00	-12.22	10.90	



Test Report No.	15020148-FCC-E
Page	13 of 34



Test Data

Phase Neutral Plot at 230Vac, 50Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.17	50.26	64.77	-14.51	37.55	54.77	-17.21	11.87
4.27	31.93	56.00	-24.07	18.73	46.00	-27.27	10.94
4.18	32.23	56.00	-23.77	19.49	46.00	-26.51	10.94
17.39	35.87	60.00	-24.13	26.45	50.00	-23.55	11.48
17.84	35.59	60.00	-24.41	26.77	50.00	-23.23	11.50
0.74	35.39	56.00	-20.61	28.00	46.00	-18.00	10.89



Test Report No.	15020148-FCC-E	
Page	14 of 34	

6.2 Radiated Emissions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar
Test date :	March 25, 2015
Tested By:	Deon Dai

Requirement(s):

Spec	Item	Requirement		Applicable		
47CFR§15.10 7(d)	a)	Except higher limit as specified elsewhere in oth the low-power radio-frequency devices shall not specified in the following table and the level of a exceed the level of the fundamental emission. The band edges Frequency range (MHz) 30 – 88 88 – 216 216 960 Above 960	t exceed the field strength levels any unwanted emissions shall not			
Test Setup		Support Units Turn Table Socm Ground Pla Test Receive	Ant. Tower 1-4m Variable	_		
Procedure	 The EUT was switched on and allowed to warm up to its normal operating condition. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner: Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen. The EUT was then rotated to the direction that gave the maximum emission. Finally, the antenna height was adjusted to the height that gave the maximum emission. For emission frequencies measured below and above 1GHz, set the spectrum analyzer on a 100kHz and 1MHz resolution bandwidth respectively for each frequency measured. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured. 					
Remark						
Result	Pass	Fail				
Test Data Test Plot	∕es ∕es (See be	N/A N/A				



Test Report No.	15020148-FCC-E
Page	15 of 34

Data sample

Frequency (MHz)	Quasi Peak (dBμV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
XXX	32.23	181.00	Н	350.00	-38.23	40.00	-7.77

Frequency (MHz) = Emission frequency in MHz

Quais-Peak (dB μ V/m)= Receiver Reading(dB μ V/m)+ Factor(dB)

Azimuth=Position of turn table

Polarity=Polarity of Receiver antenna

Height(cm)= Height of Receiver antenna

Factor (dB)=Antenna factor + cable loss- antenna gain

Limit (dB μ V/m)=Limit stated in standard

Calculation Formula:

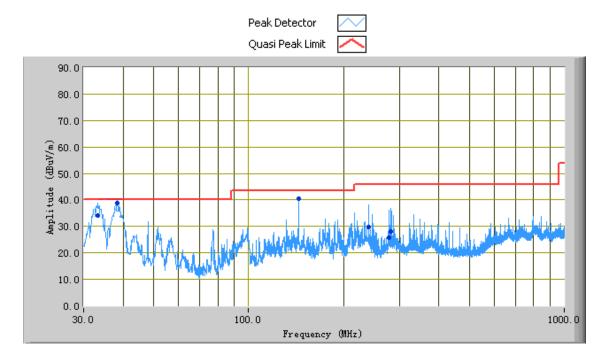
Margin (dB)=Quasi Peak (dB μ V/m) – limit (dB μ V/m)



Test Report No.	15020148-FCC-E
Page	16 of 34

Test Mode: Charging and Downloading(Worse Case)

(Below 1GHz)



Test Data

Vertical Polarity Plot @3m

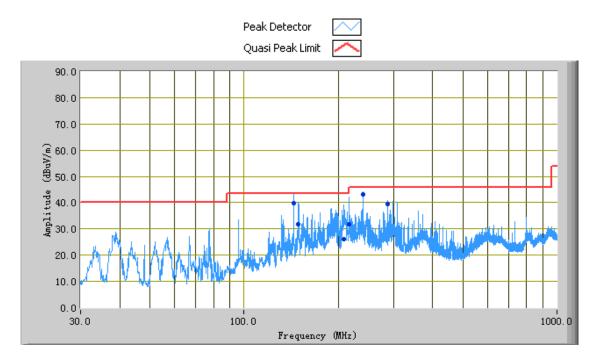
vertical Polarity Plot @5111							
Frequency (MHz)	Quasi Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
38.46	38.87	232.00	V	111.00	-28.44	40.00	-1.13
144.02	40.44	164.00	V	109.00	-31.11	43.50	-3.06
33.52	33.37	232.00	V	110.00	-29.18	40.00	-6.63
239.98	29.92	204.00	V	100.00	-29.90	46.00	-16.08
282.93	28.04	126.00	V	196.00	-29.71	46.00	-17.96
277.90	25.77	175.00	V	250.00	-29.73	46.00	-20.23



Test Report No.	15020148-FCC-E
Page	17 of 34

Test Mode:	Charging and Downloading(Worse Case)
------------	--------------------------------------

(Below 1GHz)



Test Data

Horizontal Polarity Plot @3m

Frequency (MHz)	Quasi Peak (dBµV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBµV/m)	Margin (dB)
144.00	39.80	200.00	Н	100.00	-31.45	43.50	-3.70
240.00	43.30	252.00	Н	123.00	-28.50	46.00	-2.70
148.94	31.65	118.00	Н	198.00	-31.45	43.50	-11.85
216.59	31.76	195.00	Н	114.00	-30.29	46.00	-14.24
207.94	26.21	102.00	Н	307.00	-30.93	43.50	-17.29
287.99	39.57	325.00	Н	118.00	-29.00	46.00	-6.43

Note: The data above 1 GHz which below 20 dB to the limit was not recorded.



Test Report No.	15020148-FCC-E
Page	18 of 34

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
AC Line Conducted Emissions					
R&S EMI Test Receiver	ESPI3	101216	11/04/2014	11/03/2015	>
V-LISN	ESH3-Z5	838979/005	09/27/2014	09/26/2015	>
INFOMW Antenna (1 ~18GHz)	JXTXLB- 10180	J2031081120092	10/09/2014	10/08/2015	•
SIEMIC Labview Conducted Emissions software	V1.0	N/A	N/A	N/A	>
Radiated Emissions					
Hp Spectrum Analyzer	8563E	3821A09023	10/09/2014	10/08/2015	>
R&S EMI Receiver	ESPI3	101216	11/04/2014	11/03/2015	>
Antenna (30MHz~6GHz)	JB6	A121411	04/15/2014	04/14/2015	>
EMCO Horn Antenna (1 ~18GHz)	3115	N/A	11/15/2014	11/14/2015	>
INFOMW Antenna (1 ~18GHz)	JXTXLB- 10180	J2031081120092	10/09/2014	10/08/2015	>
Horn Antenna (18~40GHz)	AH-840	101013	04/22/2014	04/22/2015	V
Microwave Pre-Amp (18~40GHz)	PA-840	181250	05/29/2014	05/28/2015	V
Hp Agilent Pre-Amplifier	8447F	1937A01160	10/27/2014	10/26/2015	>
MITEQ Pre-Amplifier (0.1 ~ 18GHz)	LPA-6-30	1451709	06/25/2014	06/24/2015	V
SIEMIC Labview Radiated Emissions software	V1.0	N/A	N/A	N/A	V



Test Report No.	15020148-FCC-E
Page	19 of 34

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo



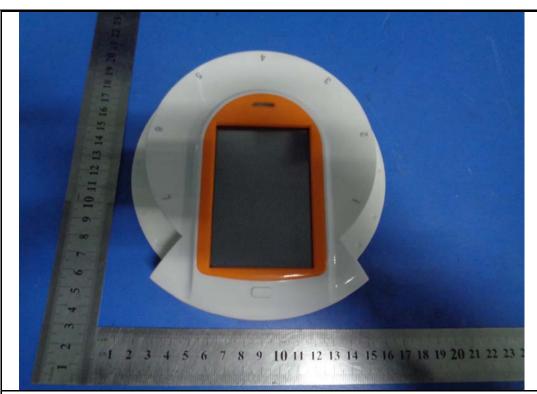
Whole Package - Top View 1



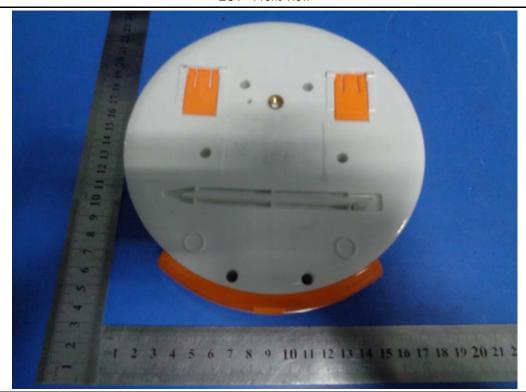
Whole Package - Top View 2



Test Report No.	15020148-FCC-E
Page	20 of 34



EUT - Front View



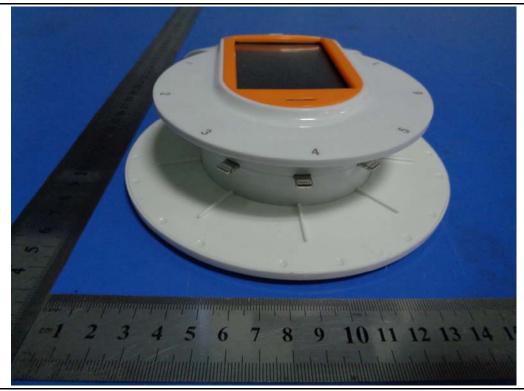
EUT - Rear View



Test Report No.	15020148-FCC-E
Page	21 of 34



EUT - Top View



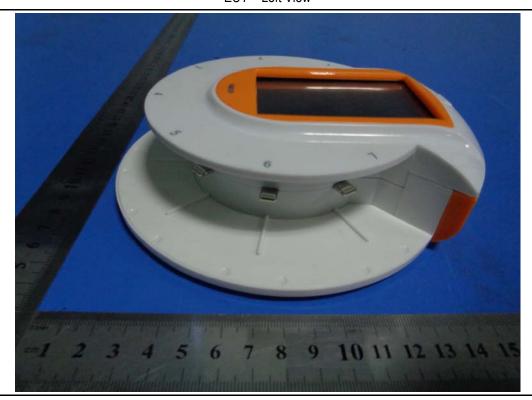
EUT - Bottom View



Test Report No.	15020148-FCC-E
Page	22 of 34



EUT - Left View

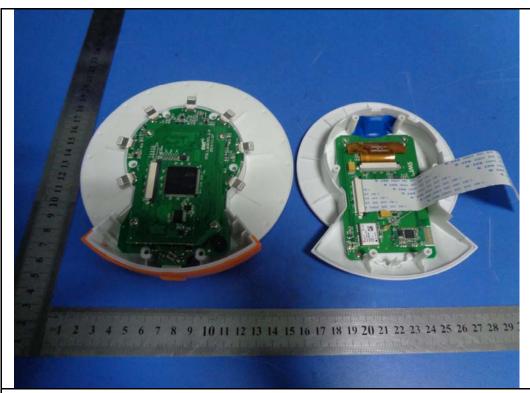


EUT – Right View



Test Report No.	15020148-FCC-E
Page	23 of 34

Annex B.ii. Photograph: EUT Internal Photo



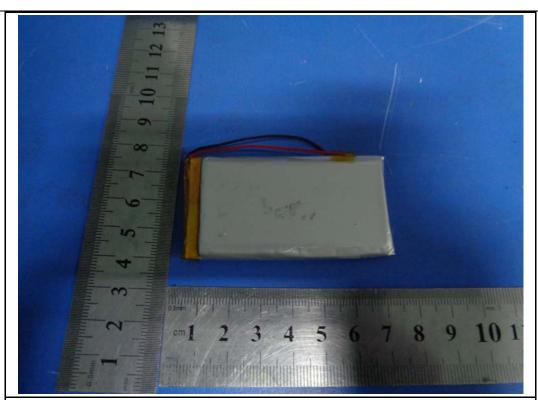
EUT - Uncover Front View



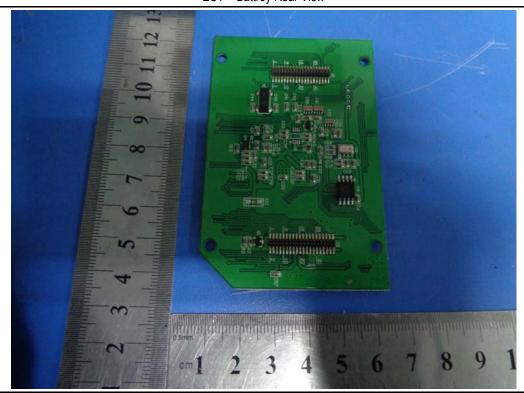
EUT – Battrey Front View



Test Report No.	15020148-FCC-E
Page	24 of 34



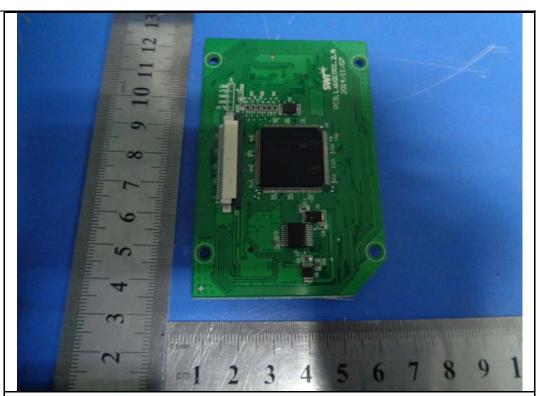
EUT - Battrey Rear View



EUT - PCBA 1 Front View



Test Report No.	15020148-FCC-E
Page	25 of 34



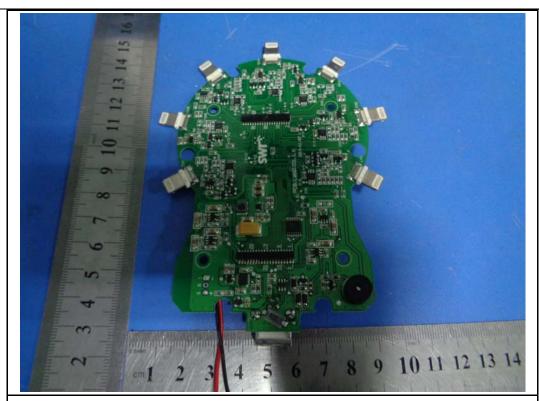
EUT - PCBA 1 Rear View



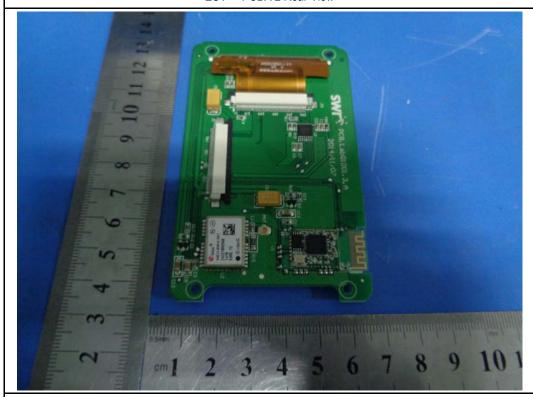
EUT - PCBA 2 Front View



Test Report No.	15020148-FCC-E
Page	26 of 34



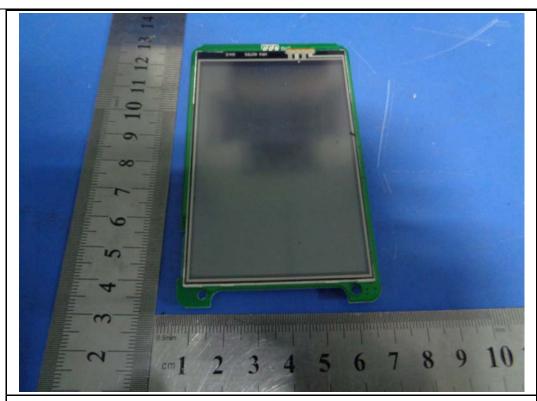
EUT - PCBA 2 Rear View



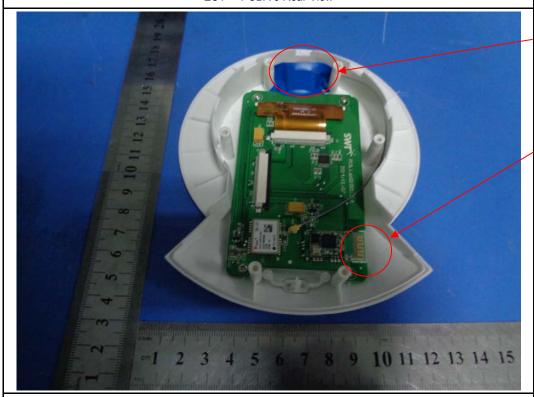
EUT - PCBA 3 Front View



Test Report No.	15020148-FCC-E
Page	27 of 34



EUT - PCBA 3 Rear View



Antenna – Front View

GPS Antenna

BLE/Bluetooth Antenna



Test Report No.	15020148-FCC-E
Page	28 of 34

Annex B.iii. Photograph: Test Setup Photo



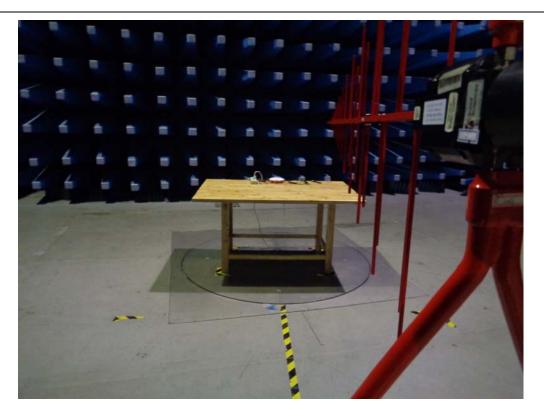
Conducted Emissions Setup Front View



Conducted Emissions Setup Side View



Test Report No.	15020148-FCC-E
Page	29 of 34



Radiated Emissions Setup Below 1GHz Front View



Radiated Emissions Setup Above 1GHz Front View

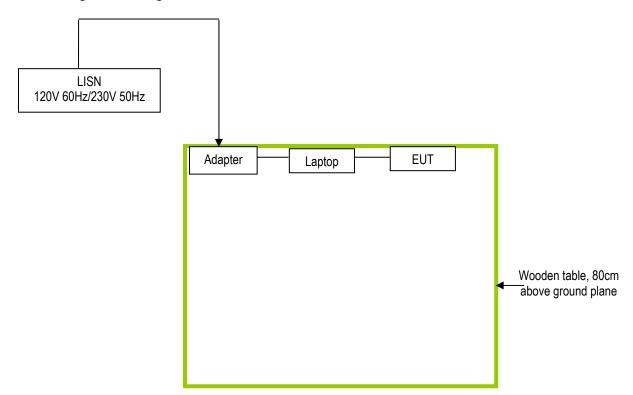


Test Report No.	15020148-FCC-E
Page	30 of 34

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.i. TEST SET UP BLOCK

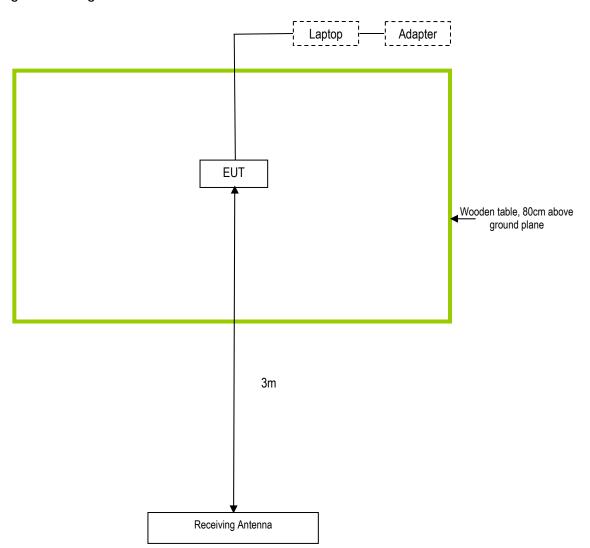
Block Configuration Diagram for Conducted Emissions





Test Report No.	15020148-FCC-E
Page	31 of 34

Block Configuration Diagram for Radiated Emissions





Test Report No.	15020148-FCC-E
Page	32 of 34

Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description	Model	Calibration Date
Gateway	Gateway Laptop	MS2288 & LXWHF02013951C3CA92200	N/A



Test Report No.	15020148-FCC-E
Page	33 of 34

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see Attachment



Test Report No.	15020148-FCC-E
Page	34 of 34

Annex E. DECLARATION OF SIMILARITY

	120	Fi	ve Models	of SenseDis	SC .		
Sensors Models							
No.	Name	SD00	SD0010 Basic	SD0020 Advanced	SD0030 Physics	SD0040 Biochemistry	SD0050 Environmen
			(yellow)	(orange)	(grey)	(blue)	(green)
1	Voltage sensor						
2	Current sensor						
3	Temperature sensor						
4	Motion sensor						
5	Force sensor						
6	Photogate sensor		g 9				
7	Sound level sensor						
8	Air pressure sensor						
9	Humidity sensor						
10	Light sensor						
11	DO sensor						
12	pH sensor						
13	Conductivity sensor						
14	Heart rate sensor						
15	Thermocouple sensor						
16	mV sensor						1
17	UV sensor						
18	UI						
	GPS						
Built-in sensors	Ambient temperature						
	Barometer						
	Accelerometer(3 Axis)						T

For our business issue and marketing requirement, we would like to list different model numbers on the FCC reports and certification as following:modelSD00, model SD0010, model SD0020, model SD0030, model SD0040 model SD0050. The five models have the same Circuits, and PCB. The difference of these models are have different sensor and color, the different sensor does not affect the RF power. FCC ID: 2AEEJ-SD

Client's signature

Client's name / title Ningjiang Xiao /Manager

Contact information / address Jiangsu SWR Science & Technology Co.,Ltd NO.14 Junnong Road,Qinhuai District ,Nanjing, Jiangsu Province,China