

FCC TEST REPORT

Product : Active Stylus
Trade mark : SAMSUNG
Model/Type reference : SPEN-SAM-01
Serial Number : N/A
Report Number : EED32K003015
FCC ID : 2ABWESPENSAM01
Date of Issue : Nov. 30, 2018
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Sunwoda Electronic Co., Ltd.

**1/F, 2/F of Area A&B&D, 3-9F, Administration Building, No.2, Yihe Rd.,
Shilong Community, Shiyao Street, Bao'an District, SHENZHEN, China**

Prepared by:

**Centre Testing International Group Co., Ltd.
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Date:

Nov. 30, 2018

Check No.:3096306640



2 Version

Version No.	Date	Description
00	Nov. 30, 2018	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10-2013 Section 6.2	N/A
Radiated Emissions	47 CFR Part 15, Subpart C Section 15.209	ANSI C63.10-2013 Section 6.4&6.5&6.6&6.10	PASS
20dB Bandwidth	47 CFR Part 15, Subpart C Section 15.215	ANSI C63.10-2013 Section 6.9.2	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

N/A: The tested sample is supplied by battery, there is no DC input/output port, therefore it is not applicable.

4 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 TEST SUMMARY	3
4 CONTENTS	4
5 GENERAL INFORMATION	5
5.1 CLIENT INFORMATION.....	5
5.2 GENERAL DESCRIPTION OF EUT.....	5
5.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD.....	5
5.4 TEST ENVIRONMENT AND MODE.....	5
5.5 DESCRIPTION OF SUPPORT UNITS.....	5
5.6 TEST LOCATION.....	6
5.7 DEVIATION FROM STANDARDS.....	6
5.8 ABNORMALITIES FROM STANDARD CONDITIONS.....	6
5.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	6
5.10 MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2).....	6
6 EQUIPMENT LIST	7
7 TEST RESULT & MEASUREMENT DATA	9
7.1 ANTENNA REQUIREMENT.....	9
7.2 RADIATED EMISSIONS.....	10
7.3 20DB BANDWIDTH.....	18
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP	20
APPENDIX 2 PHOTOGRAPHS OF EUT	22

5 General Information

5.1 Client Information

Applicant:	Sunwoda Electronic Co., Ltd.
Address of Applicant:	1/F, 2/F of Area A&B&D, 3-9F, Administration Building, No.2, Yihe Rd., Shilong Community, Shiyan Street, Bao'an District, SHENZHEN, China
Factory:	Sunwoda Electronic Co., Ltd.
Address of Factory:	1/F, 2/F of Area A&B&D, 3-9F, Administration Building, No.2, Yihe Rd., Shilong Community, Shiyan Street, Bao'an District, SHENZHEN, China
Factory:	Shenzhen Sunwoda Intelligent Hardware co. LTD
Address of Factory:	101, No. 6-6, Yanshan avenue, Yanchuan community, Yanluo street, Bao'an district, Shenzhen, China

5.2 General Description of EUT

Product Name:	Active Stylus
Model No.(EUT):	SPEN-SAM-01
Trade Mark:	SAMSUNG
EUT Supports Radios application:	18KHz to 44KHz
Power Supply:	ALKALINE BATTERY 1.5V(AAAA))

5.3 Product Specification subjective to this standard

Carrier Frequency:	18KHz to 44KHz
Modulation Type:	ASK
Antenna Type:	Dipole antenna
Antenna Gain:	0dBi
Hardware Version:	V 1.0(manufacturer declare)
Firmware Version:	SS1.0(manufacturer declare)
Test voltage:	ALKALINE BATTERY 1.5V(AAAA)
Sample Received Date:	Nov. 08, 2018
Sample tested Date:	Nov. 14, 2018 to Nov. 30, 2018

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	26 °C
Humidity:	48% RH
Atmospheric Pressure:	1010mbar
Test mode:	
TX mode:	The EUT transmitted the continuous signal at the frequency of 18KHz and 44KHz.

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101

Telephone: +86 (0) 755 3368 3668 Fax: +86 (0) 755 3368 3385

No tests were sub-contracted.

FCC Designation No.: CN1164

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

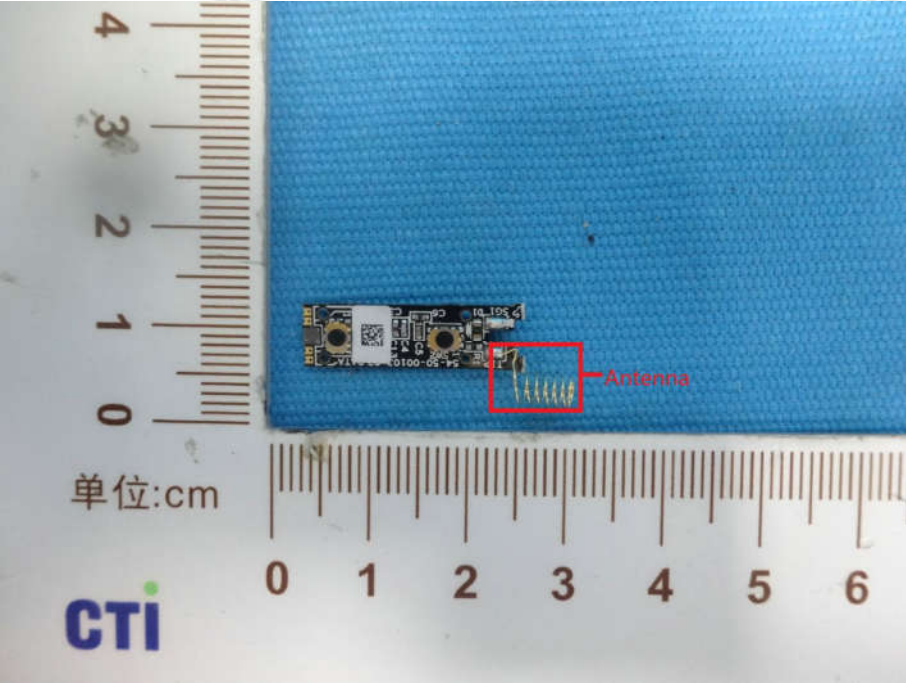
6 Equipment List

RF Conducted test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018	05-10-2019
DC Power	Keysight	E3642A	MY54426035	03-13-2018	03-12-2019
high-low temperature test chamber	DongGuangQinZhuo	LK-80GA	QZ20150611879	03-16-2018	03-15-2019
Temperature/Humidity Indicator	TAYLOR	1451	---	05-02-2018	05-01-2019

Radiated Emission Test					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	10-28-2018	10-27-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-30-2018	07-29-2019
Microwave Preamplifier	Agilent	8449B	3008A02425	08-21-2018	08-20-2019
Microwave Preamplifier	Tonscend	EMC05184 5SE	980380	01-19-2018	01-18-2019
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-23-2021
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018	05-10-2019
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Multi device Controller	maturio	NCD/070/1 0711112	---	01-10-2018	01-09-2019
LISN	schwarzbeck	NNBM8125	81251547	05-11-2018	05-10-2019
LISN	schwarzbeck	NNBM8125	81251548	05-11-2018	05-10-2019
Signal Generator	Agilent	E4438C	MY45095744	03-13-2018	03-12-2019
Signal Generator	Keysight	E8257D	MY53401106	03-13-2018	03-12-2019
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Communication test set	Agilent	E5515C	GB47050534	03-16-2018	03-15-2019
Cable line	Fulai(7M)	SF106	5219/6A	01-10-2018	01-09-2019
Cable line	Fulai(6M)	SF106	5220/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5216/6A	01-10-2018	01-09-2019
Cable line	Fulai(3M)	SF106	5217/6A	01-10-2018	01-09-2019
Communication test set	R&S	CMW500	104466	02-05-2018	02-04-2019
High-pass filter	Sinoscite	FL3CX03W G18NM12-0398-002	---	01-10-2018	01-09-2019
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01C A09CL12-0395-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX01C A08CL12-0393-001	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02C A04CL12-0396-002	---	01-10-2018	01-09-2019
band rejection filter	Sinoscite	FL5CX02C A03CL12-0394-001	---	01-10-2018	01-09-2019

7 Test Result & Measurement Data

7.1 Antenna Requirement

Standard Requirement:	47 CFR Part 15C Section 15.203
15.203 Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.	
EUT Antenna: 	
The antenna is dipole antenna and no consideration of replacement. The best case gain of the antenna is 0dBi.	

7.2 Radiated Emissions

Test Requirement: 47 CFR Part 15C Section 15.201

Test Method: ANSI C63.10-2013

Test Site: 3m (Semi-Anechoic Chamber)

Limit: All emissions are at least 40 dB below the limits in § 15.209

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Quasi-peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Quasi-peak	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Quasi-peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Quasi-peak	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

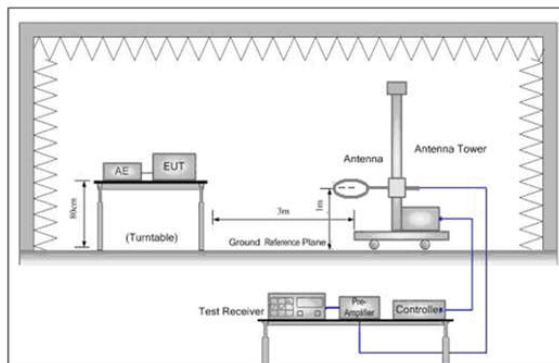


Figure 1. Below 30MHz

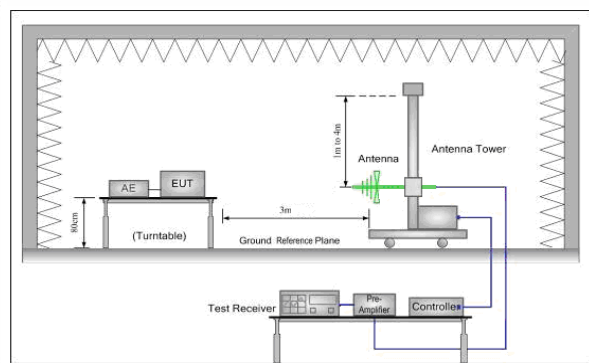


Figure 2. 30MHz to 1GHz

Test Procedure:

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is placed 1m above the ground find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. The center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3

Test Mode: Transmitting mode

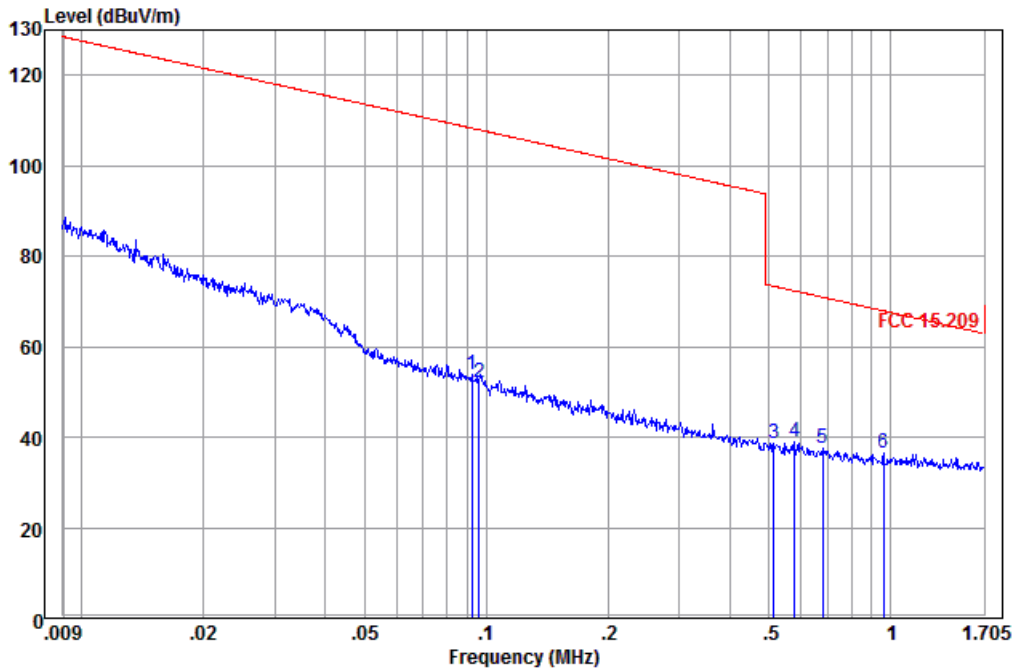
Instruments Used: Refer to section 6 for details

Test Result: Pass

Measurement Data:

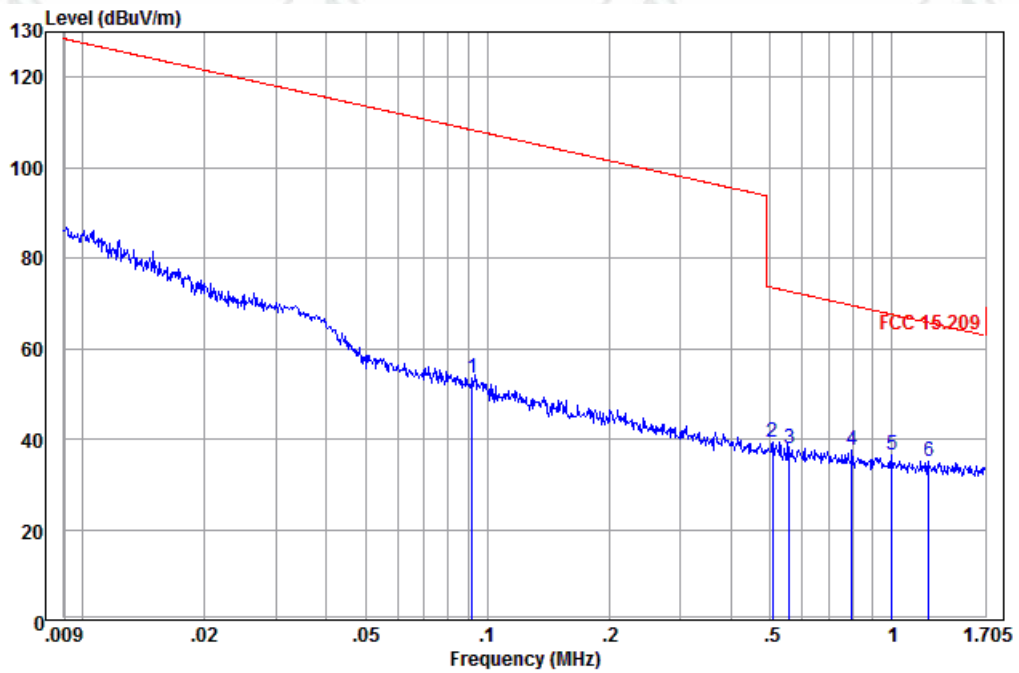
Product : Active Stylus
Temperature : 23°C
9K-1.705M
Horizontal

Model/Type reference : SPEN-SAM-01
Humidity : 54%



	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.092	25.61	0.10	28.10	53.81	108.29	-54.48	Horizontal QP
2	0.096	25.58	0.11	26.42	52.11	107.92	-55.81	Horizontal QP
3	0.516	24.85	0.12	13.47	38.44	73.35	-34.91	Horizontal QP
4	0.579	24.85	0.12	13.88	38.85	72.34	-33.49	Horizontal QP
5	0.681	24.85	0.12	12.46	37.43	70.92	-33.49	Horizontal QP
6 pp	0.963	24.85	0.13	11.62	36.60	67.90	-31.30	Horizontal QP

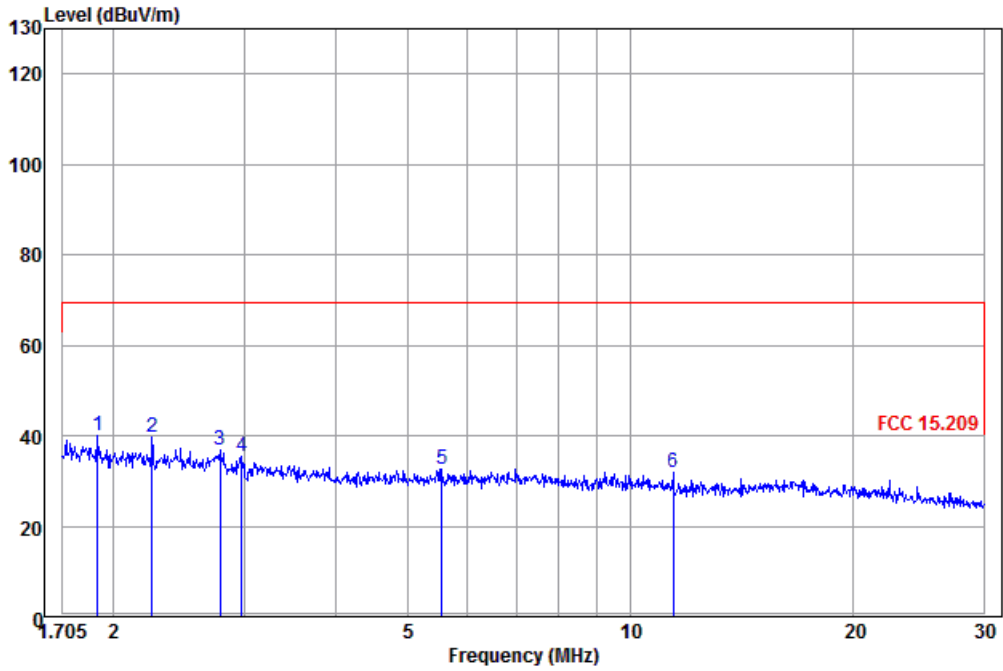
Vertical



	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.092	25.61	0.10	27.76	53.47	108.33	-54.86	Vertical QP
2	0.508	24.85	0.12	14.28	39.25	73.49	-34.24	Vertical QP
3	0.558	24.85	0.12	13.00	37.97	72.66	-34.69	Vertical QP
4	0.797	24.85	0.12	12.54	37.51	69.55	-32.04	Vertical QP
5	1.004	24.85	0.13	11.35	36.33	67.53	-31.20	Vertical QP
6 pp	1.238	24.94	0.15	10.09	35.18	65.70	-30.52	Vertical QP

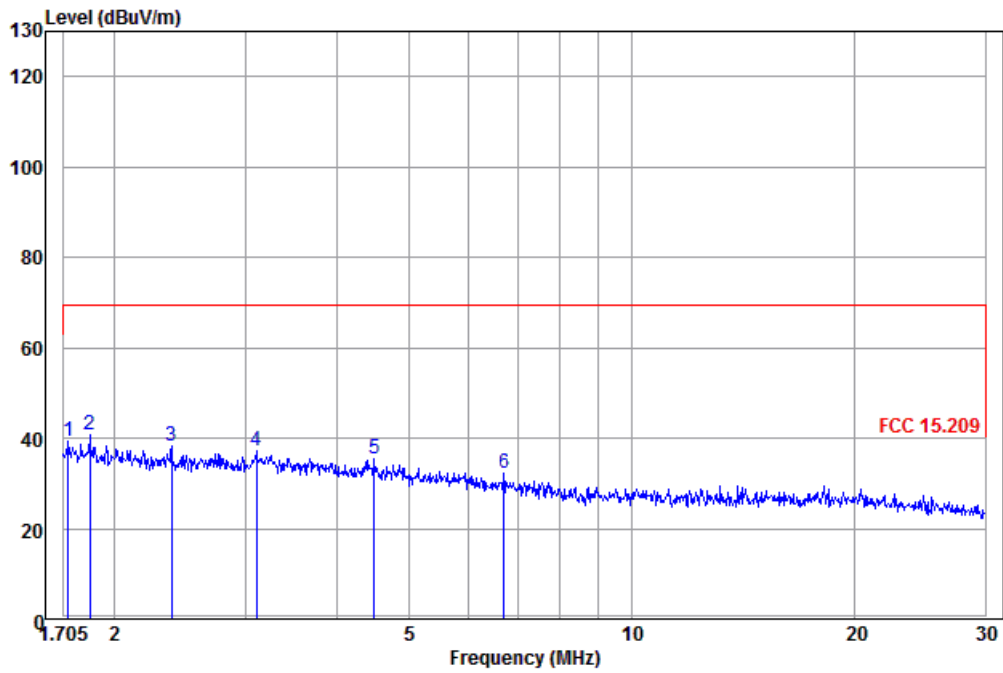
1.705M-30M

Horizontal



	Ant Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	pp	1.901	25.13	0.19	14.87	40.19	69.50	-29.31	Horizontal QP
2		2.252	25.18	0.19	14.20	39.57	69.50	-29.93	Horizontal QP
3		2.784	25.23	0.17	11.49	36.89	69.50	-32.61	Horizontal QP
4		2.974	25.25	0.16	10.09	35.50	69.50	-34.00	Horizontal QP
5		5.557	24.71	0.22	7.76	32.69	69.50	-36.81	Horizontal QP
6		11.414	23.69	0.66	7.42	31.77	69.50	-37.73	Horizontal QP

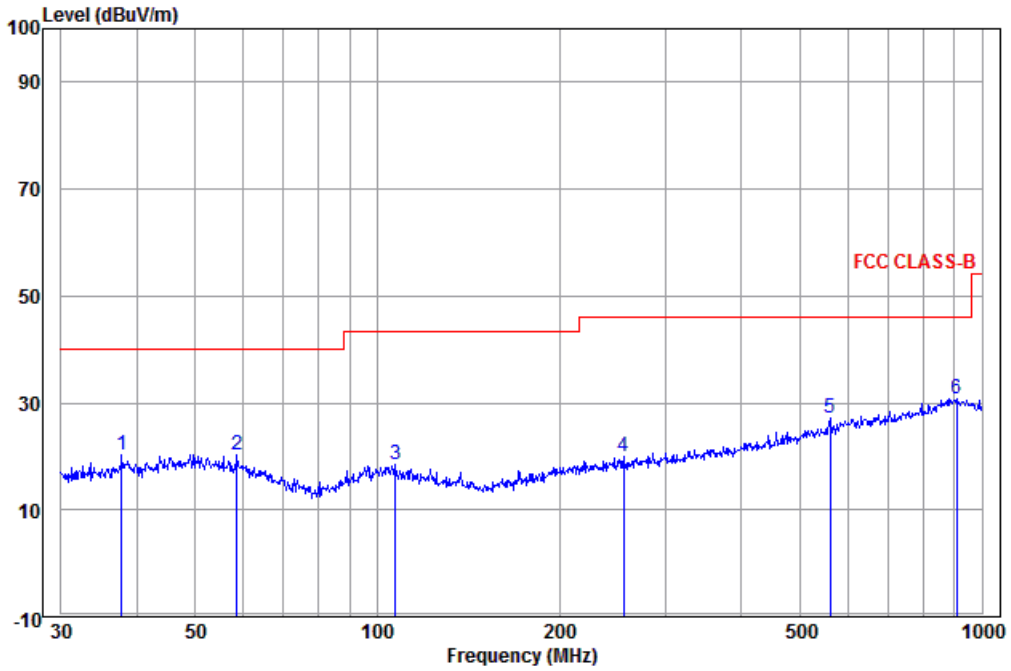
Vertical



	Ant Freq	Cable Factor	Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	1.730	25.09	0.19	14.16	39.44	69.50	-30.06	Vertical	QP
2	1.848	25.12	0.19	15.27	40.58	69.50	-28.92	Vertical	QP
3	2.385	25.19	0.18	12.92	38.29	69.50	-31.21	Vertical	QP
4	3.105	25.21	0.16	11.73	37.10	69.50	-32.40	Vertical	QP
5	4.481	24.90	0.17	10.41	35.48	69.50	-34.02	Vertical	QP
6	6.715	24.47	0.35	7.25	32.07	69.50	-37.43	Vertical	QP

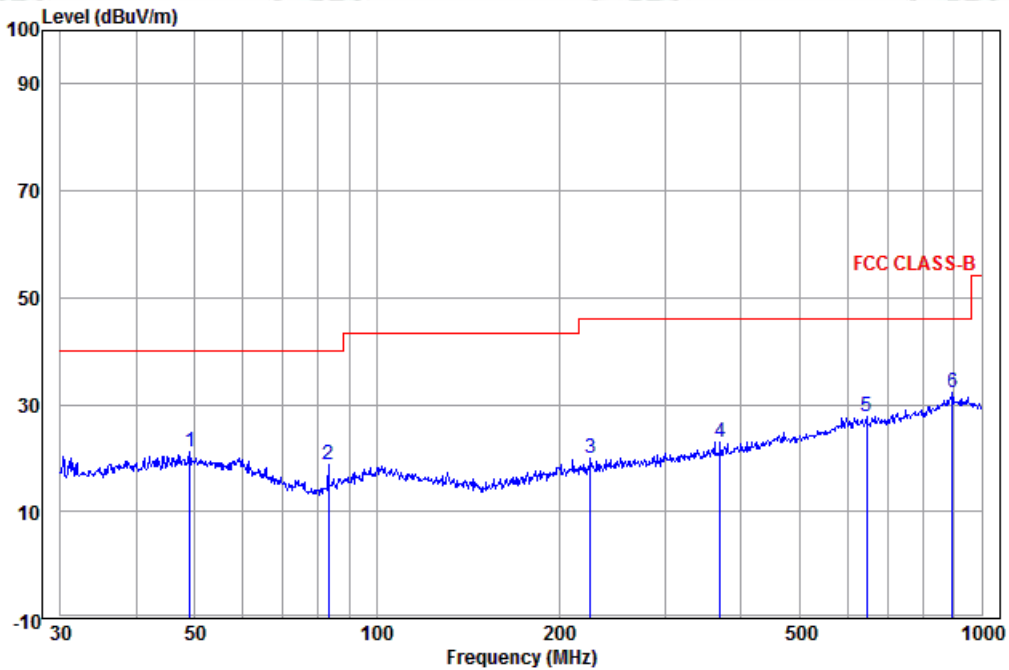
30MHz-1000MHz

Horizontal



	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	37.812	13.43	0.06	6.66	20.15	40.00	-19.85	Horizontal QP
2	58.613	13.29	0.20	6.81	20.30	40.00	-19.70	Horizontal QP
3	107.134	11.87	0.59	6.11	18.57	43.50	-24.93	Horizontal QP
4	255.623	12.70	1.31	5.98	19.99	46.00	-26.01	Horizontal QP
5	560.693	18.00	1.60	7.44	27.04	46.00	-18.96	Horizontal QP
6 pp	909.667	22.08	2.46	6.17	30.71	46.00	-15.29	Horizontal QP

Vertical



	Ant Freq	Ant Factor	Cable Loss	Read Level	Limit Level	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dB		
1	49.014	14.53	0.10	6.61	21.24	40.00	-18.76	Vertical QP
2	83.230	9.37	0.41	9.06	18.84	40.00	-21.16	Vertical QP
3	225.308	12.09	1.23	6.68	20.00	46.00	-26.00	Vertical QP
4	369.405	14.72	1.32	7.01	23.05	46.00	-22.95	Vertical QP
5	645.120	18.88	1.83	7.16	27.87	46.00	-18.13	Vertical QP
6 pp	893.857	22.00	2.49	7.78	32.27	46.00	-13.73	Vertical QP

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

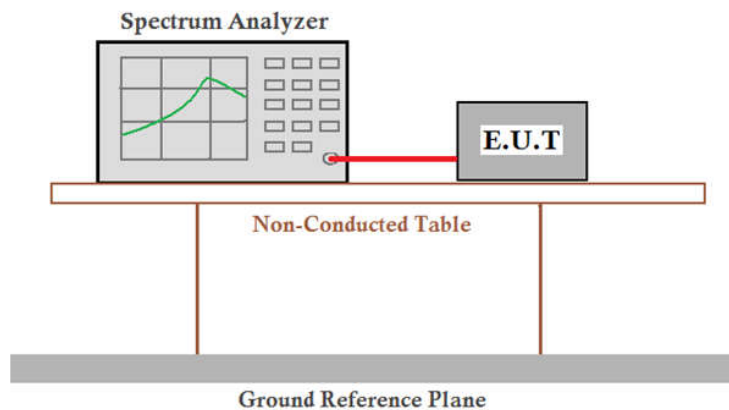
$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

7.3 20dB Bandwidth

Test Requirement: 47 CFR Part 15C Section 15.215
Test Method: ANSI C63.10-2013
Limit: Operation within the band

Requirement : Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equip compliance with the 20dB attenuation specification may base on measurement at the intentional radiator's antenna output terminal unless the intentional radiator uses a permanently attached antenna, in which case compliance shall be demonstrated by measuring the radiated emissions.

Test Setup:



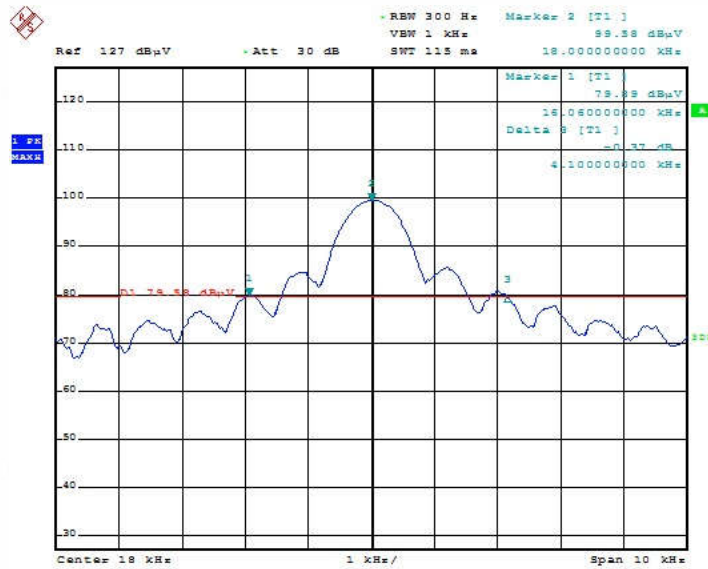
Test Mode: Transmitter mode
Instruments Used: Refer to section 6 for details
Test Result: Pass

Measurement Data:

Test Frequency	20dB bandwidth (KHz)	Result
18KHz	4.1	Pass
44KHz	4.1	Pass

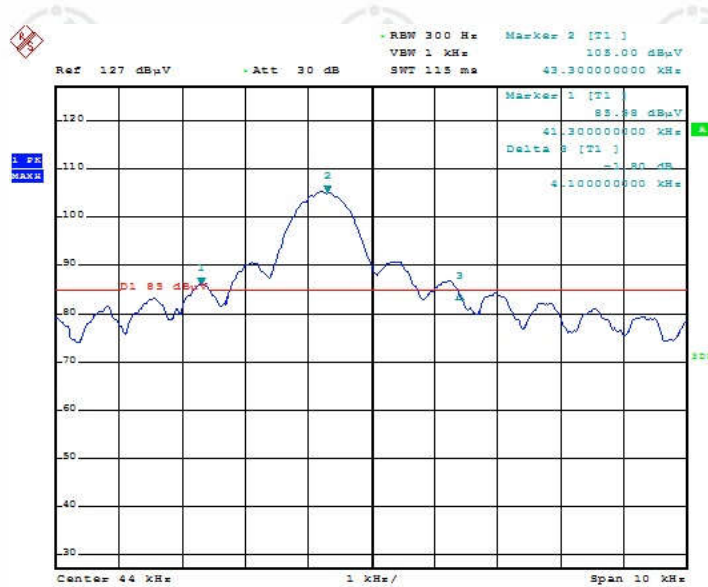
Test plot as follows:

Test mode:	Transmitter	Test channel:	18KHz
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Date: 30.NOV.2018 11:10:24

Test mode:	Transmitter	Test channel:	44KHz
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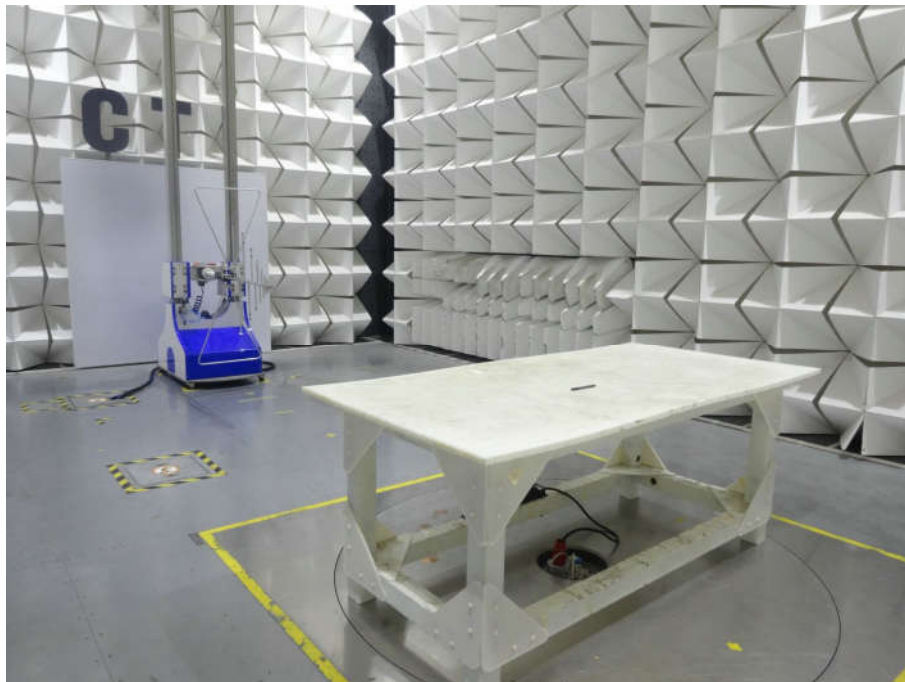
Date: 30.NOV.2018 11:18:00

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: SPEN-SAM-01



Radiated emission Test Setup-1(9kHz~30MHz)



Radiated emission Test Setup-2(30MHz~1GHz)



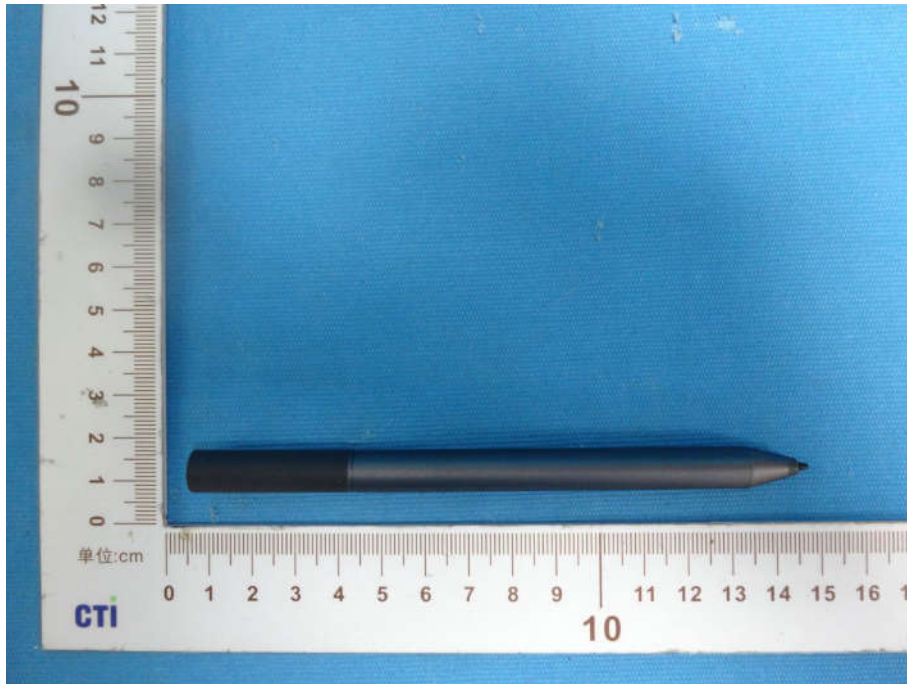
Radiated emission Test Setup-3(Close -up)

APPENDIX 2 PHOTOGRAPHS OF EUT

Test Model No.: SPEN-SAM-01



View of Product-1



View of Product-2



View of Product-3



View of Product-4



View of Product-5



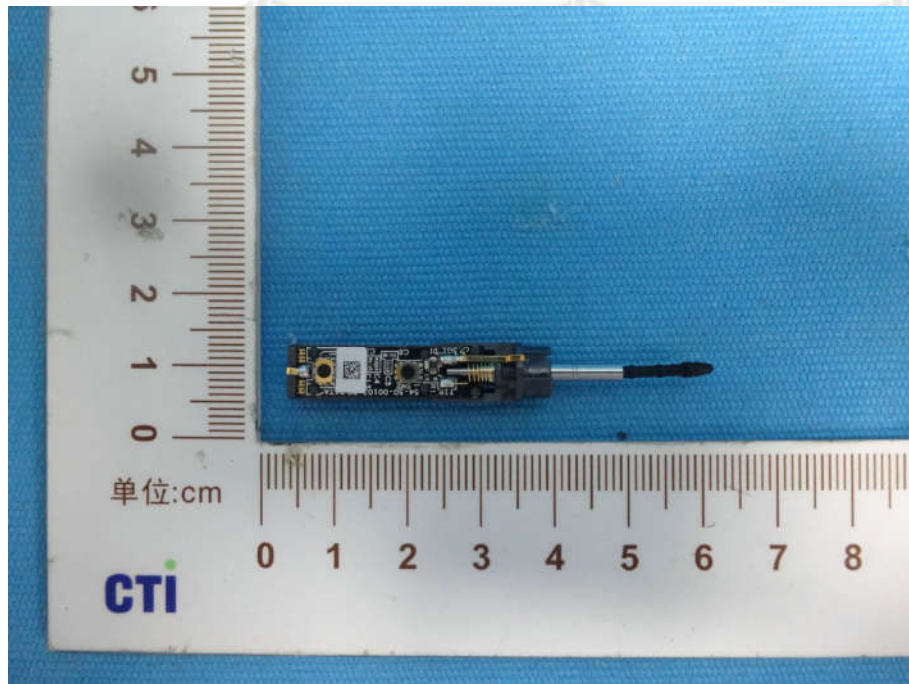
View of Product-6



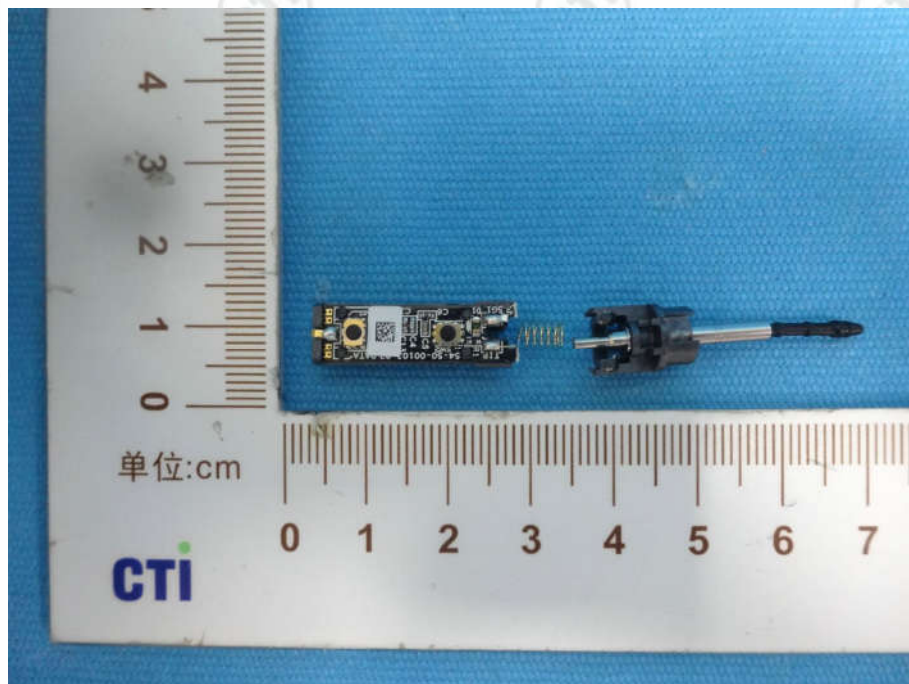
View of Product-7



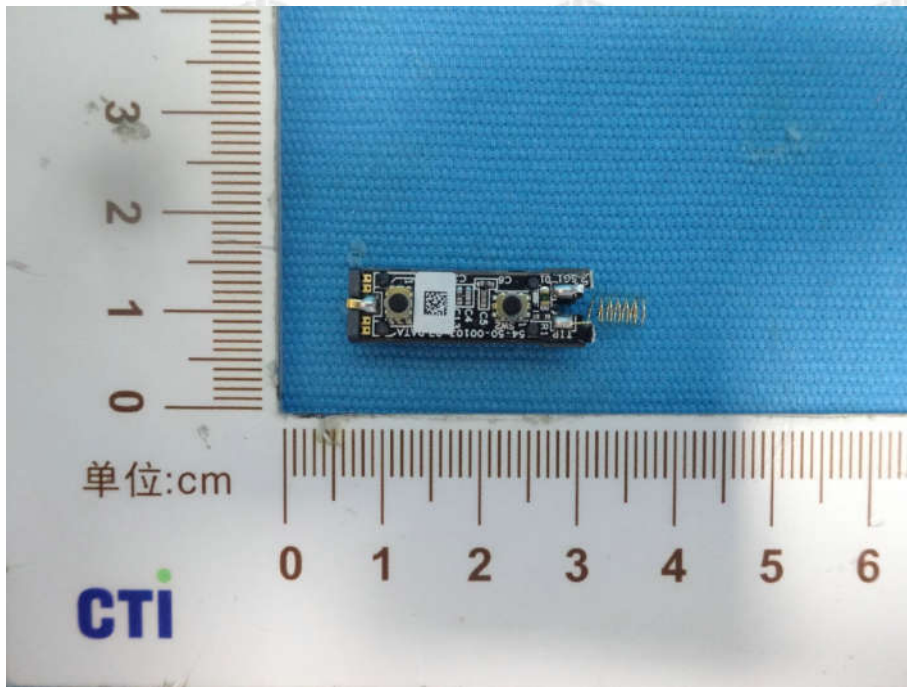
View of Product-8



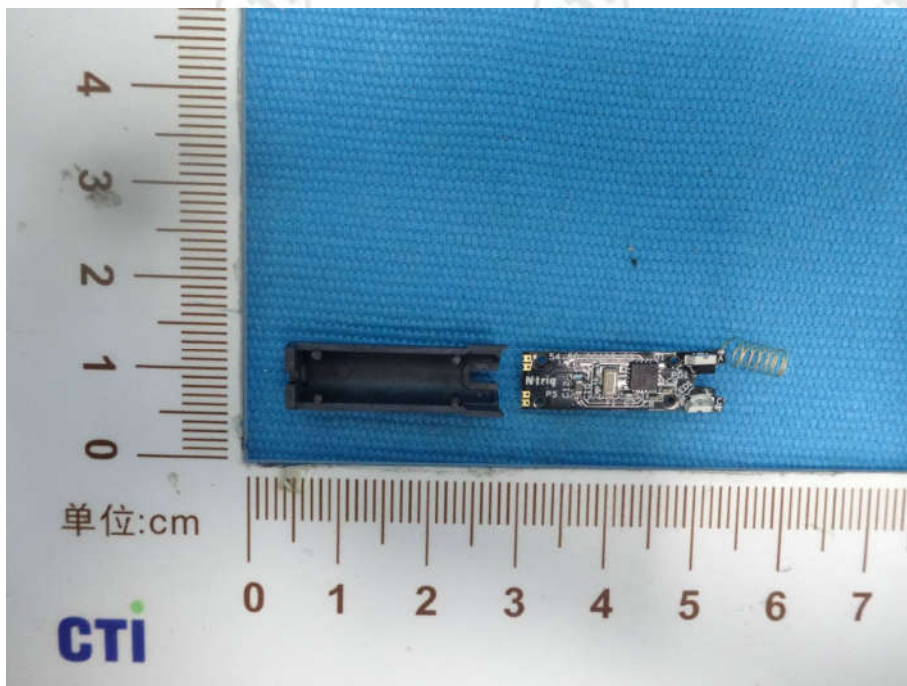
View of Product-9



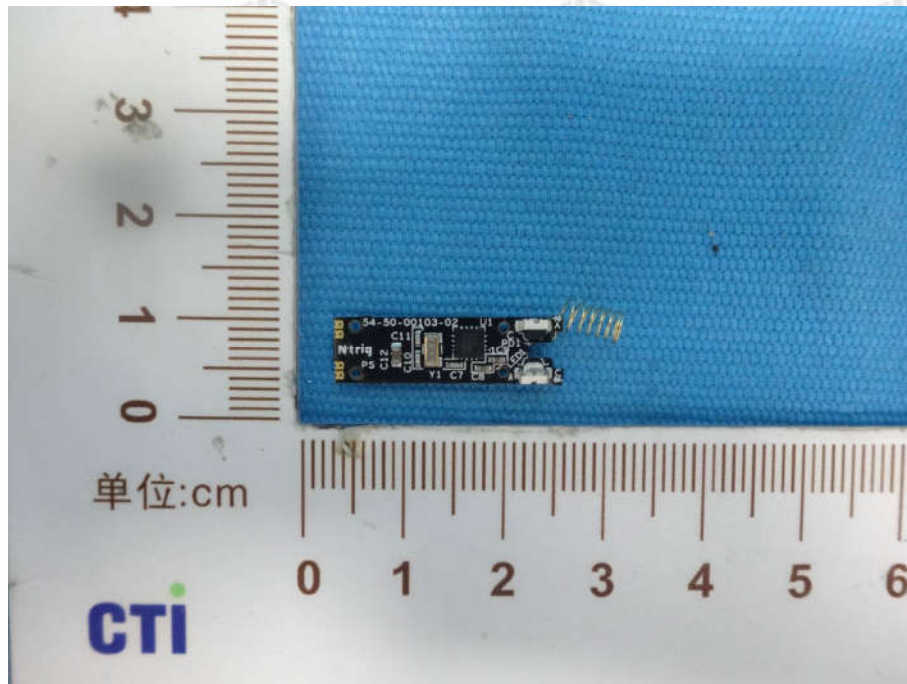
View of Product-10



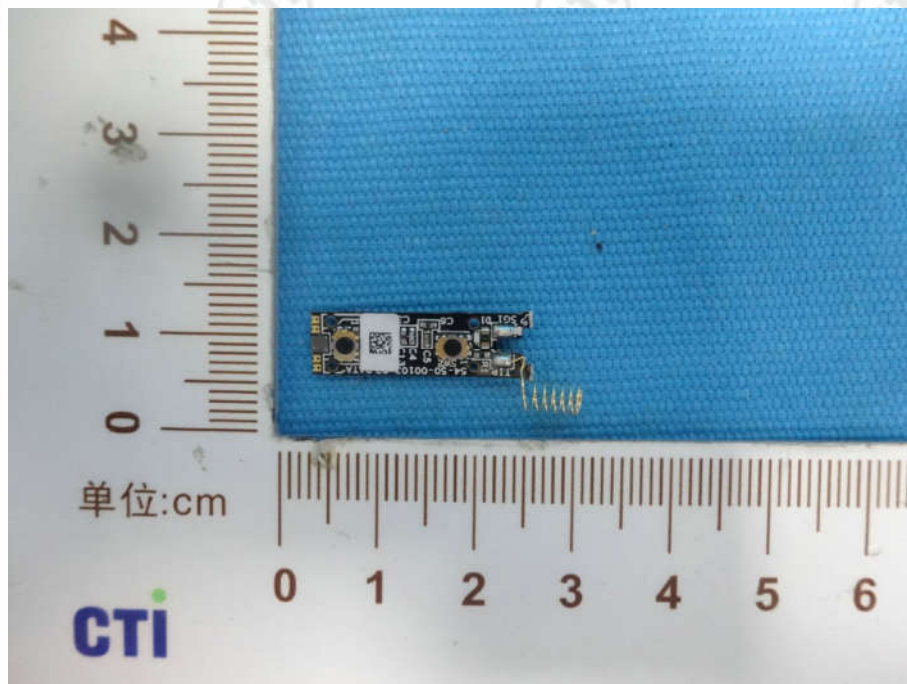
View of Product-11



View of Product-12



View of Product-13



View of Product-14

*** End of Report ***

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