

TEST REPORT

Reference No. : WTD13S1210020E
FCC ID : XAB-HEDDI-P219
Applicant : Heddolf Products Limited
Address : Unit 7, 22/F., Futura Plaza, 111-113 How Ming Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer : SAP Products Limited
Address : Xian Sha No.2 Industrial Zone, Gao Bu Town, Dongguan City, Guangdong Province, PRC.

Equipment Under Test (EUT) :

Product Name : Remote Controller
Model No. : P219-1, P219-2, S219, L219
Rules : FCC CFR47 Part 15 Section 15.231: 2012
Date of Receipt sample : Dec.16, 2013
Date of Test : Dec.17~21, 2013
Date of Issue : Dec.24, 2013
Test Result : **PASS***

*Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

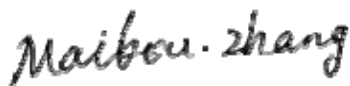
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Testing location: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Tel : +86-755-83551033

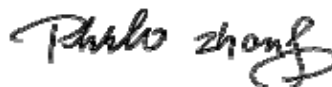
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Compiled by:



Maikou.zhang/ Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	N/A
Radiated Spurious Emissions	15.205(a) 15.209 15.231(b)	PASS
Periodic Operation	15.231(a)	PASS
20dB Bandwidth	15.231(c)	PASS
Antenna Requirement	15.203	PASS

3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	2
3 CONTENTS	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF E.U.T.	4
4.2 DETAILS OF E.U.T.	4
4.3 TEST FACILITY	4
4.4 TEST LOCATION	4
5 EQUIPMENT USED DURING TEST	5
5.1 EQUIPMENTS LIST	5
5.2 MEASUREMENT UNCERTAINTY	5
5.3 TEST EQUIPMENT CALIBRATION	5
6 CONDUCTED EMISSION TEST	6
7 RADIATION EMISSION TEST	7
7.1 EUT OPERATION:	7
7.2 TEST SETUP	7
7.3 SPECTRUM ANALYZER SETUP	9
7.4 TEST PROCEDURE	9
7.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	9
7.6 SUMMARY OF TEST RESULTS	10
8 PERIODIC OPERATION	11
9 20DB BANDWIDTH	14
9.1 TEST PROCEDURE	14
9.2 TEST RESULT	14
10 ANTENNA REQUIREMENT	15
11 PHOTOGRAPHS OF TESTING	16
11.1 RADIATION EMISSION TEST VIEW	16
12 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	18

4 General Information

4.1 General Description of E.U.T.

Product Name	: Remote Controller
Model No.	: P219-1, P219-2, S219, L219
Model Difference	: P219-1, L219, S219 are just difference in code switch. P219-1, P219-2 are difference in key. The model P219-1 is test sample.
Type of Modulation	: OOK
Frequency Range	: 318 MHz
Oscillator	: 9.9MHz
Antenna installation	: PCB Printed Antenna

4.2 Details of E.U.T.

Technical Data	: DC 3V Powered by Battery
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4.3 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.4 Test Location

All Emissions tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen 518105, China.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2	Active Loop Antenna (9kHz-30MHz)	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.20,2013	Apr.19,2014
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.20,2013	Apr.19,2014
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7	Coaxial Cable (above 1GHz)	Top	1000MHz-18GHz	EW02014-7	Apr.20,2013	Apr.19,2014

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 4.74 dB (1000M~25000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emission Test

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit
Test Result:	N/A
Remark:	This device powered by battery, this test is not applicable.

7 Radiation Emission Test

Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Frequency Range:	0.9MHz to 5GHz
Measurement Distance:	3m
Test Result:	PASS

7.1 EUT Operation:

Operating Environment:

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	1010 mbar

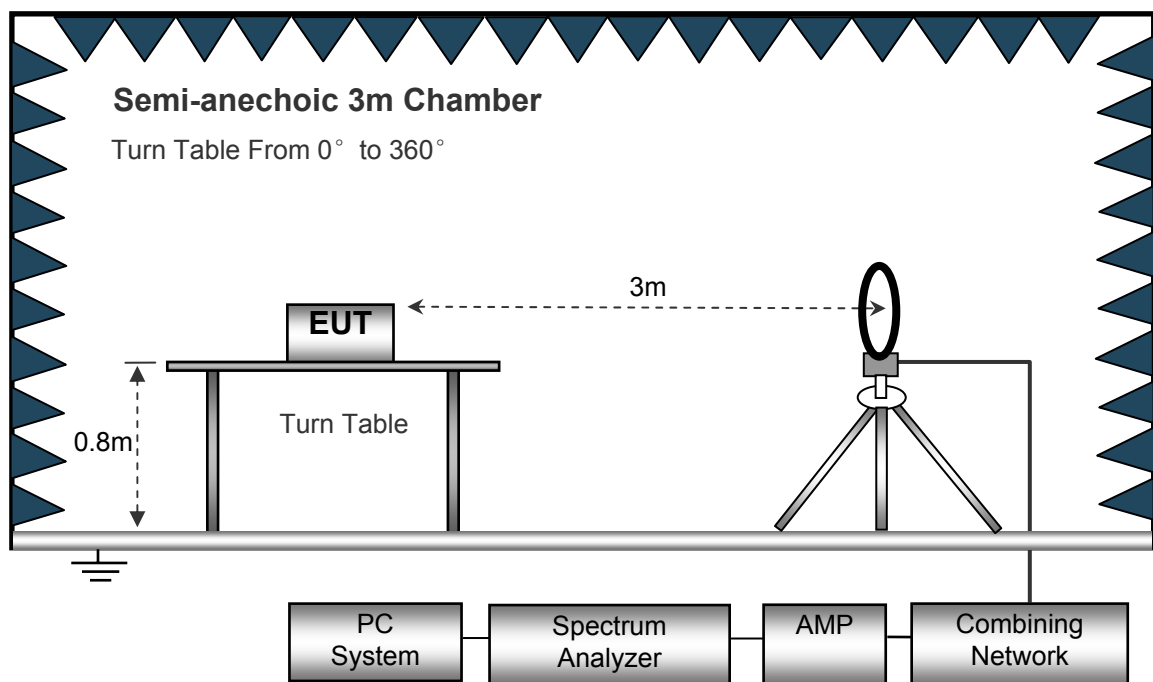
Operation Mode:

The EUT was tested in Transmitting mode, and the test data were shown as follow.

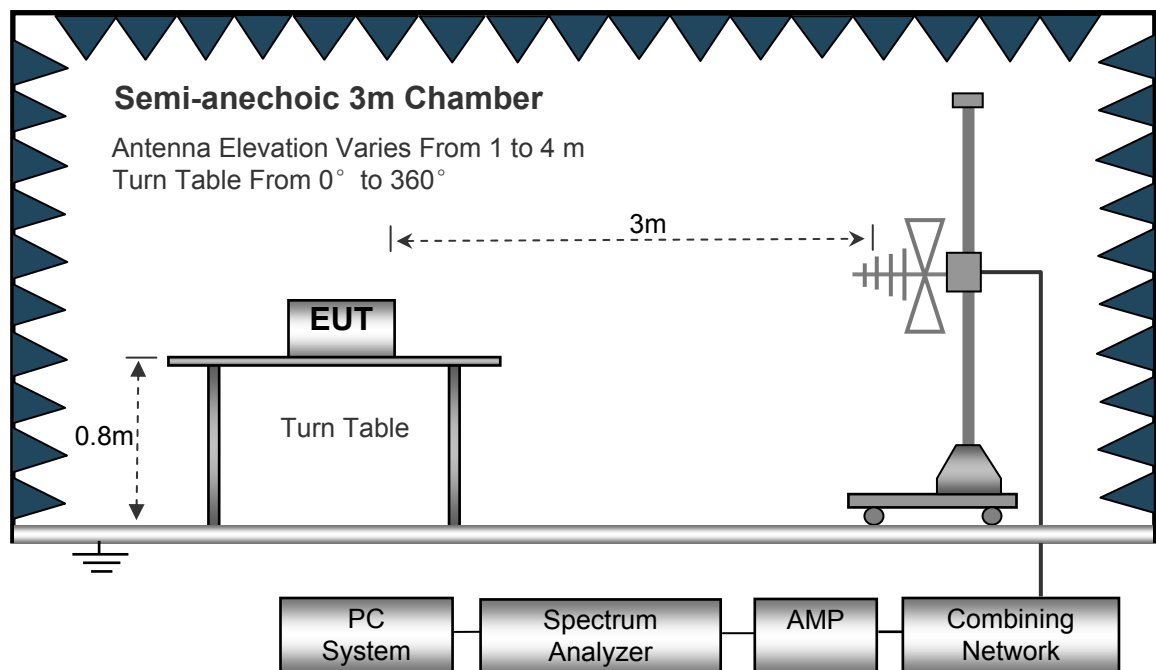
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

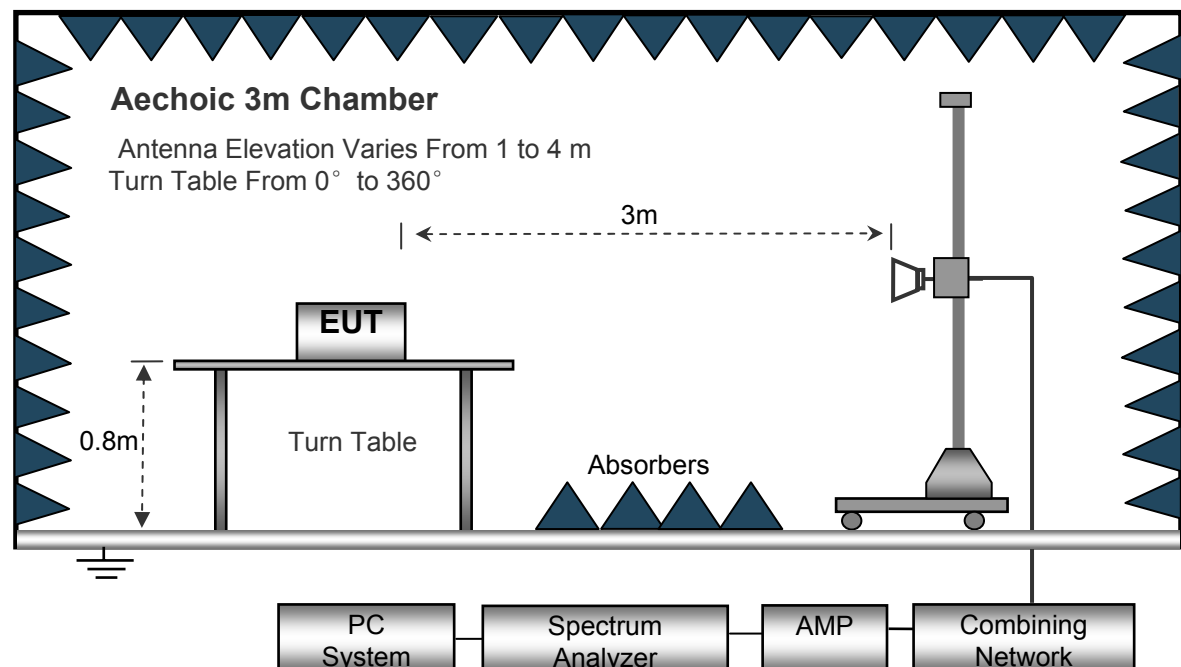
The diagram below shows the test setup that is utilized to make the measurements for emission from 9.9 MHz to 30 MHz Emissions.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 9.9MHz to 4GHz.

Below 30MHz

Sweep SpeedAuto
 IF Bandwidth.....10kHz
 Video Bandwidth.....10kHz
 Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth.....100kHz
 Video Bandwidth.....300kHz

Above 1GHz

Sweep SpeedAuto
 DetectorPK
 Resolution Bandwidth.....1MHz
 Video Bandwidth.....3MHz

7.4 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 moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X, Y, Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand). After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:
 Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain the “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency : Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 4GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.231/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
318.00	61.21	PK	87	1.1	V	17.01	78.22	95.80	-17.58
636.00	31.59	PK	216	1.7	V	25.20	56.79	75.80	-19.01
954.00	29.51	PK	303	1.2	H	27.24	56.75	75.80	-19.05
1272.00	55.24	PK	243	1.1	V	-15.83	39.41	74.00	-34.59
1590.00	49.88	PK	185	1.6	H	-15.02	34.86	74.00	-39.14
1908.00	50.23	PK	178	1.6	H	-13.49	36.74	74.00	-37.26
2319.52	50.74	PK	350	1.4	H	-13.17	37.57	74.00	-36.43

AV = Peak +20Log₁₀(duty cycle) =PK+(-5.65) [refer to section 8 for more detail]

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.231/209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV/m)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
318.00	78.22	87	1.1	V	-5.65	72.57	75.80	-3.23
636.00	56.79	216	1.7	V	-5.65	51.14	55.80	-4.66
954.00	56.75	303	1.2	H	-5.65	51.10	55.80	-4.70
1272.00	39.41	243	1.1	V	-5.65	33.76	54.00	-20.24
1590.00	34.86	185	1.6	H	-5.65	29.21	54.00	-24.79
1908.00	36.74	178	1.6	H	-5.65	31.09	54.00	-22.91
2319.52	37.57	350	1.4	H	-5.65	31.92	54.00	-22.08

8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor(dB)=20 * Log₁₀(Duty Cycle(%))

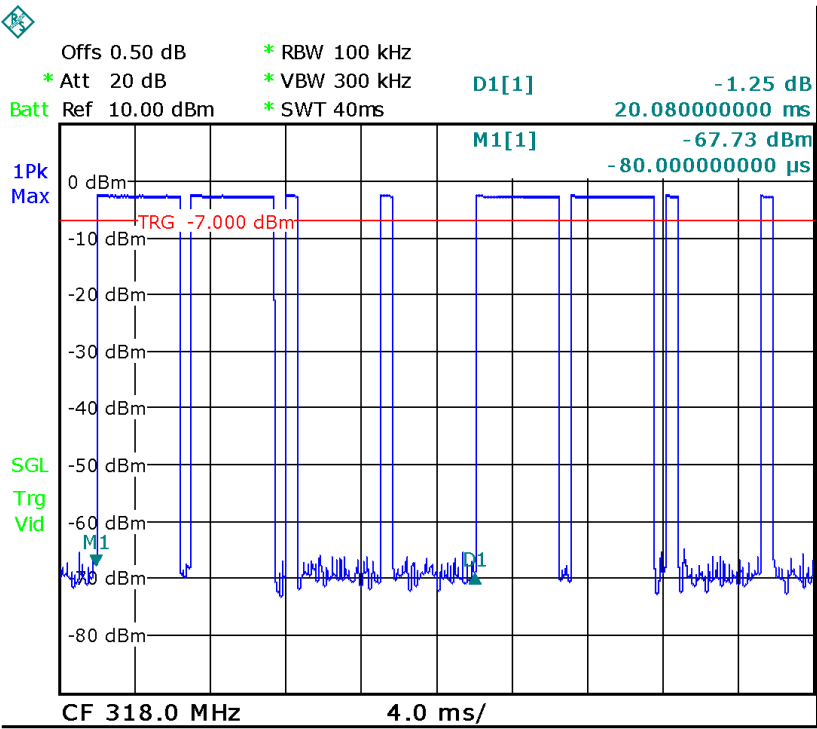
Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Pulse1	2	4.52	9.04
Pulse2	2	0.72	1.44

Total On interval in a complete pulse train(ms)	10.48
Length of a complete pulse train(ms)	20.08
Duty Cycle(%)	52.20
Duty Cycle Correction Factor(dB)	-5.65

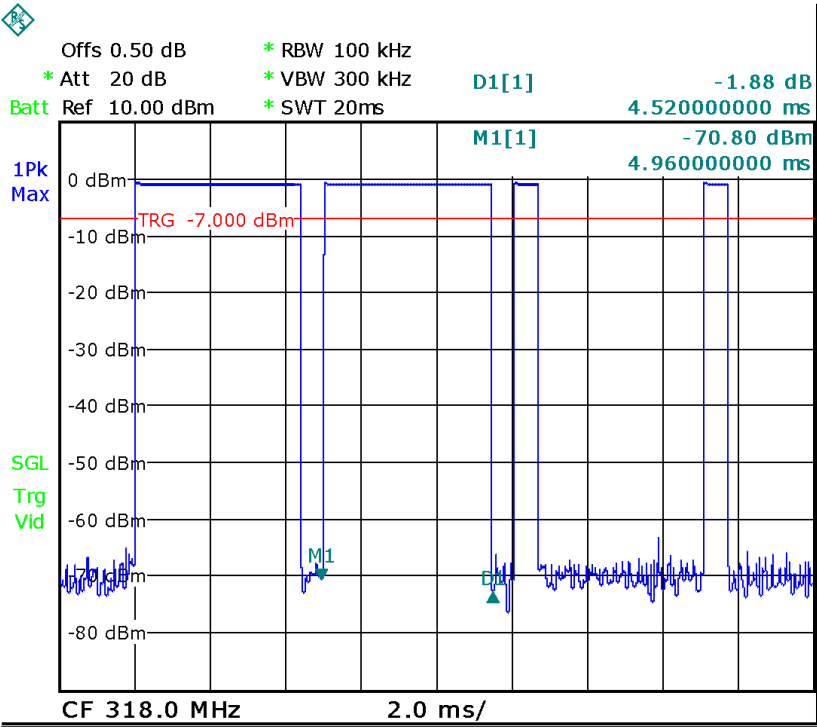
Refer to the duty cycle plot (as below), This device meets the FCC requirement.

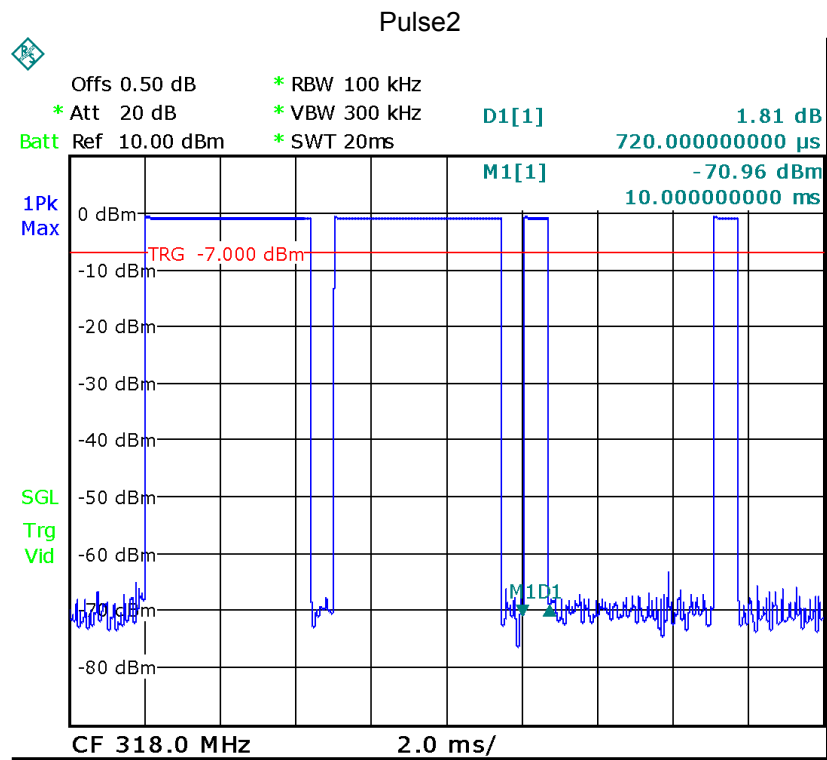
Length of a complete pulse train:

Remark: FCC part 15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

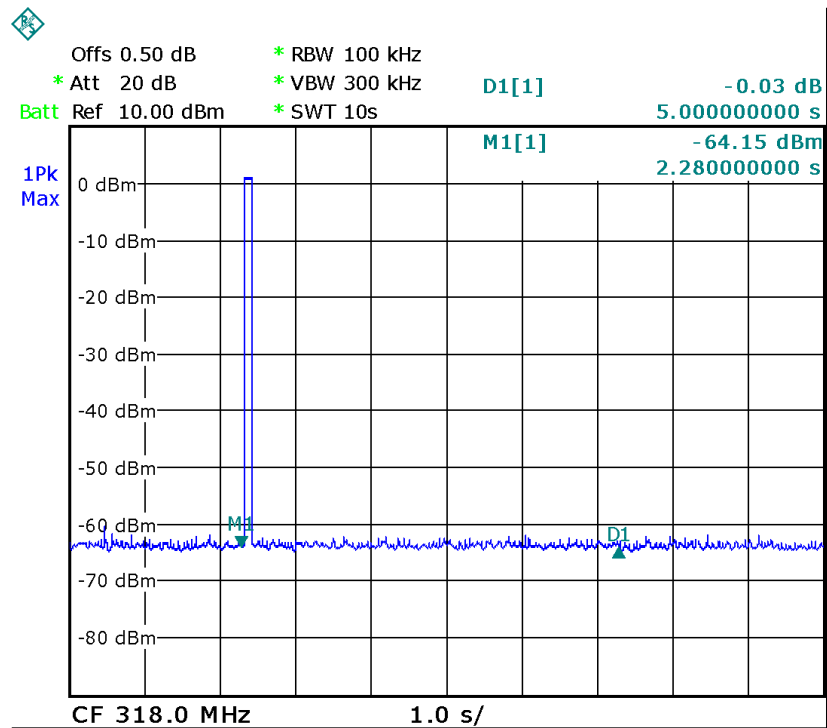


Pulse1





Refer to the plot (as below),We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter immediately, within not more than 5 seconds of being released.



9 20dB Bandwidth

Test Requirement:	FCC Part15 C
Test Method:	FCC Part15 Paragraph 15.231(c)
Limit	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

9.1 Test Procedure

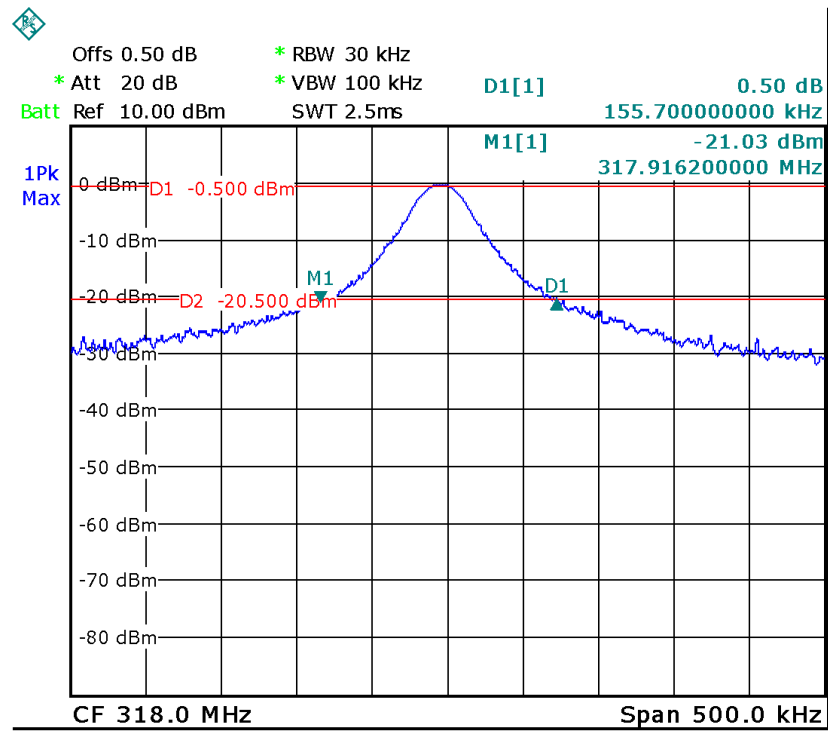
1. The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

9.2 Test Result

Frequency (MHz)	Bandwidth Emission (KHz)	Limit (kHz)	Result
318.00	155.70	795.00	Pass

Limit=Center Frequency*0.25%

Test Plot



10 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, 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 to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product use a permanent PCB printed antenna, fulfill the requirement of this section

11 Photographs of Testing

11.1 Radiation Emission Test View

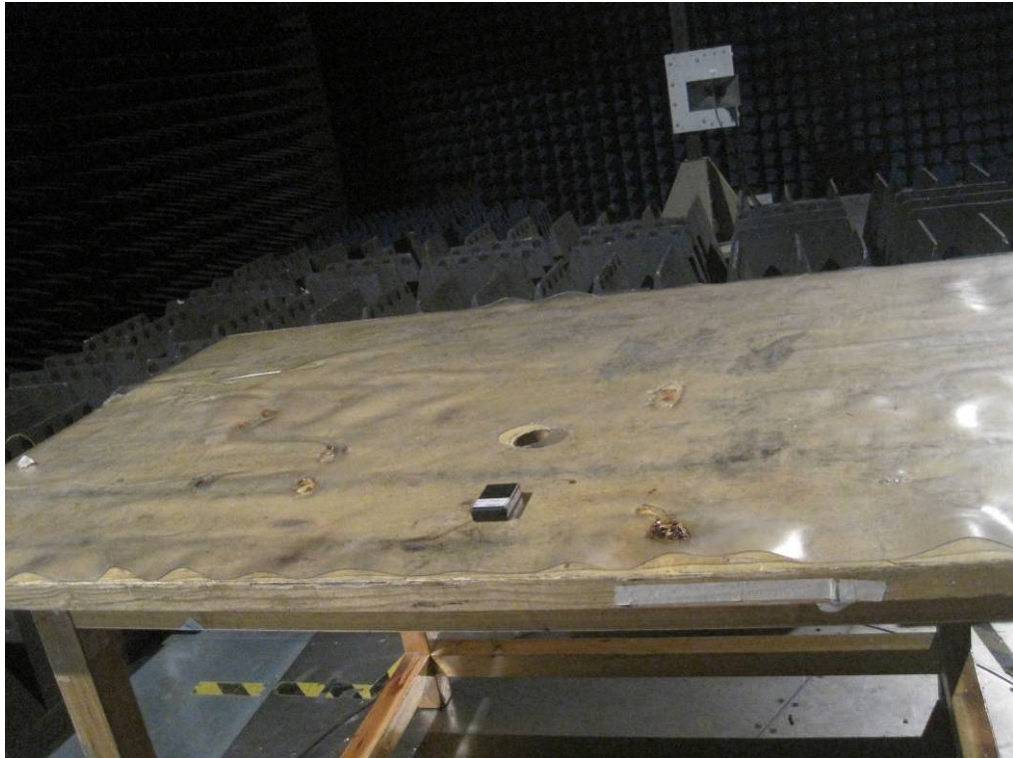
From 9.9MHz-30MHz



From 30MHz to 1GHz



Above 1GHz



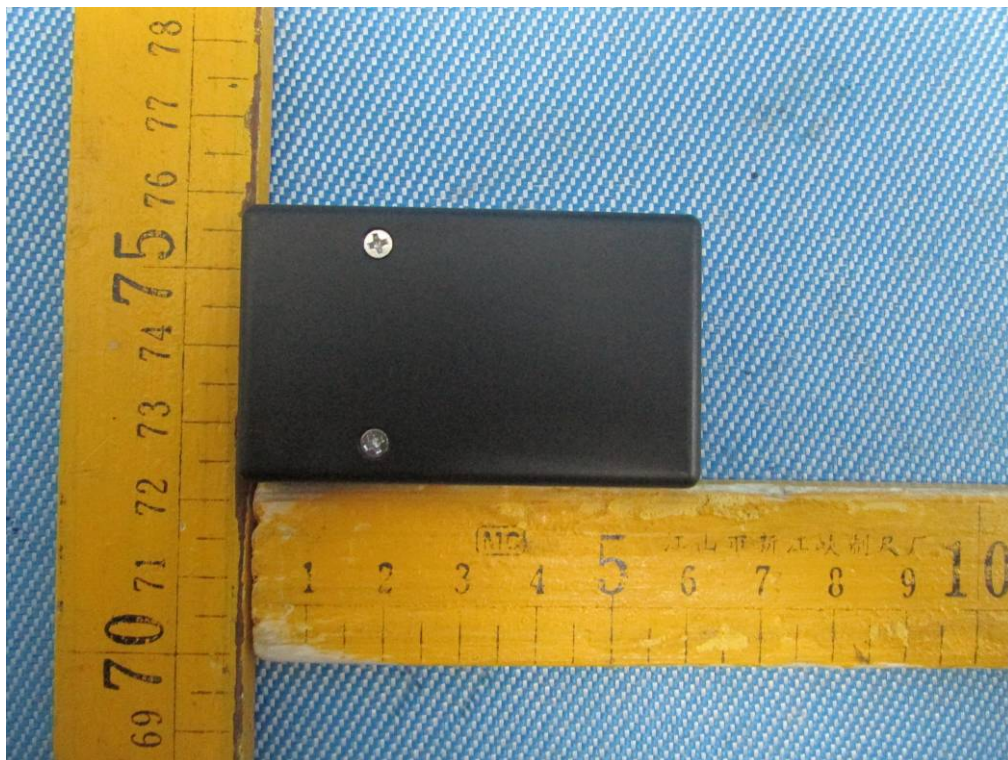
12 Photographs - Constructional Details

P219-1, S219, L219



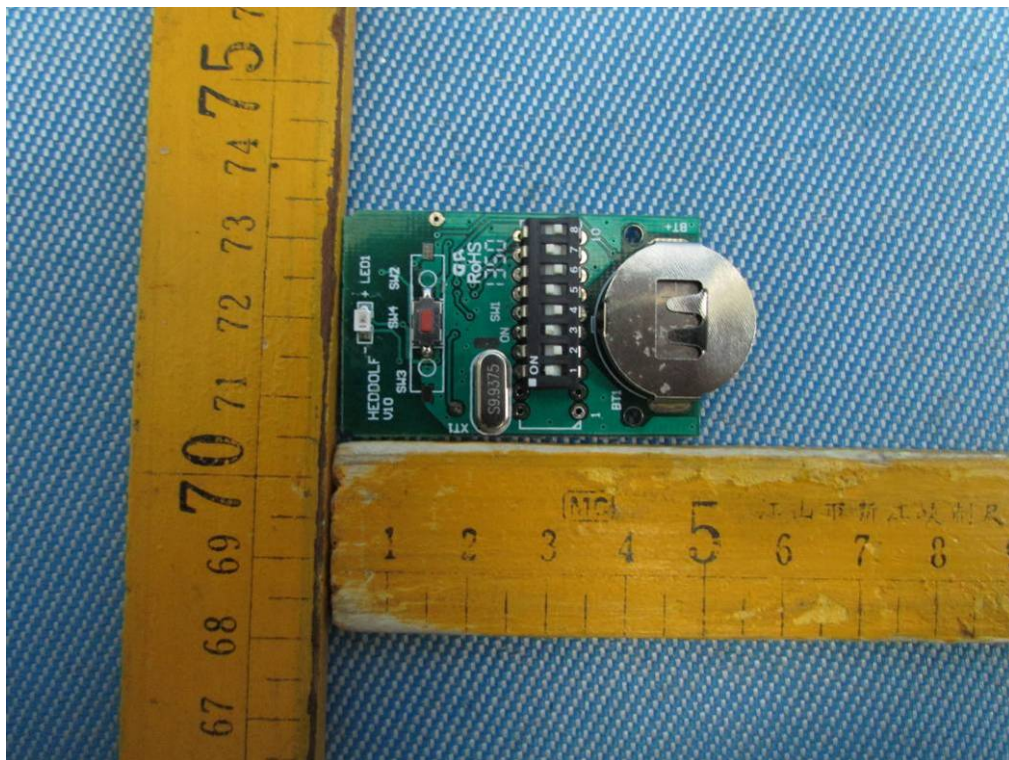
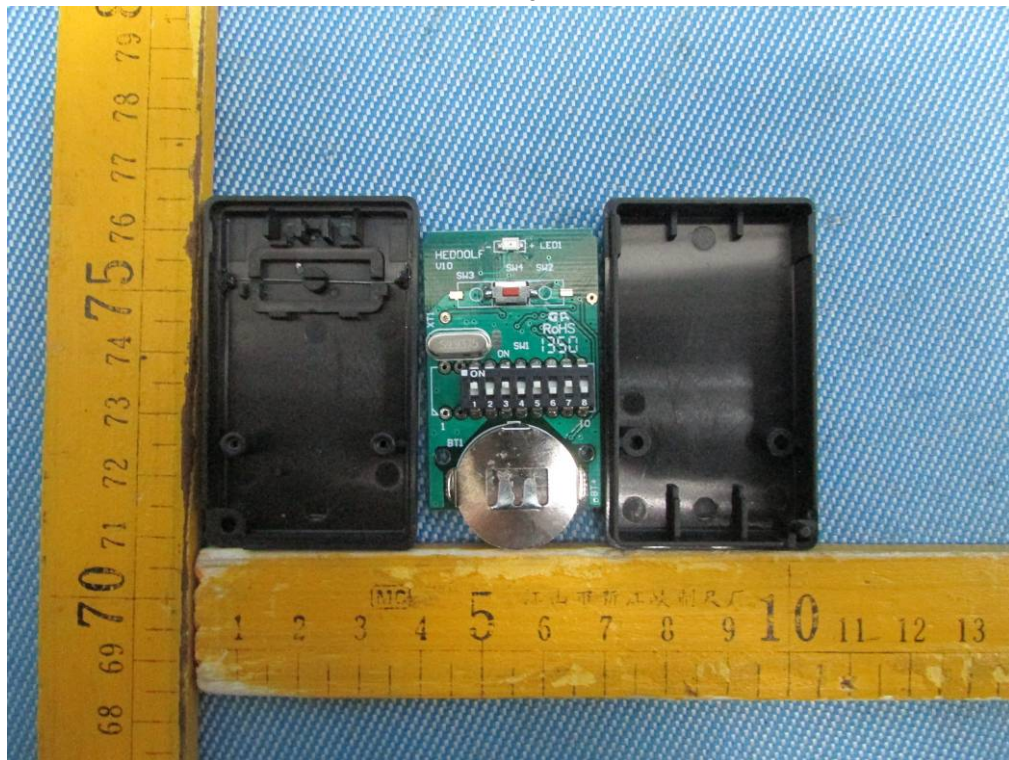


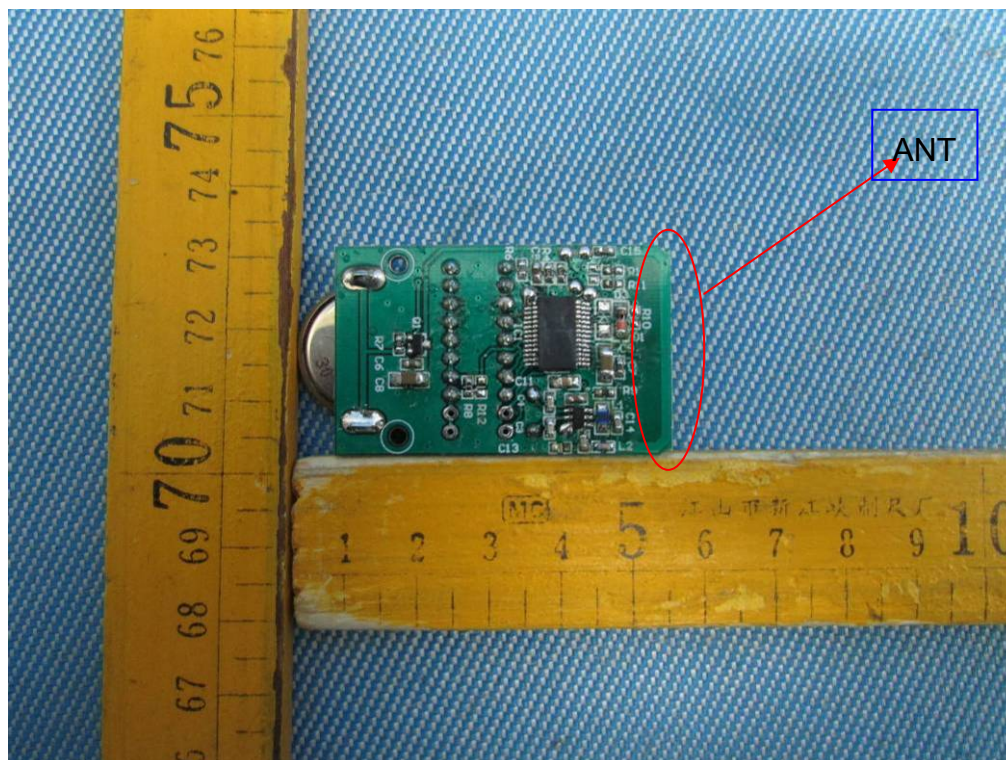
P219-2



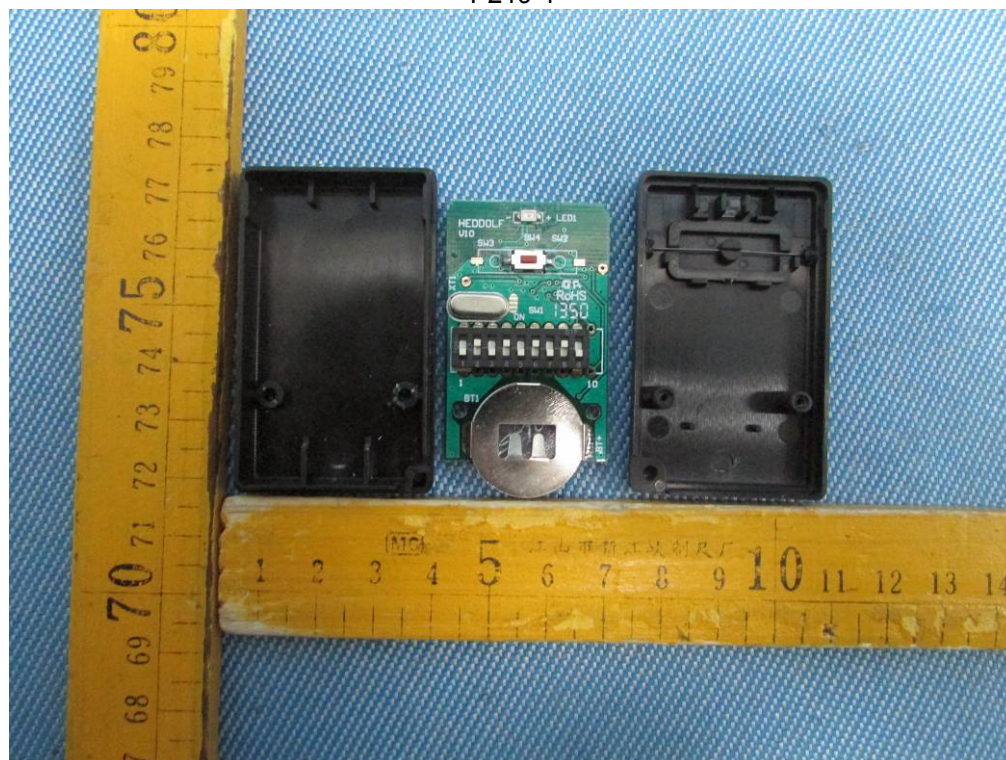


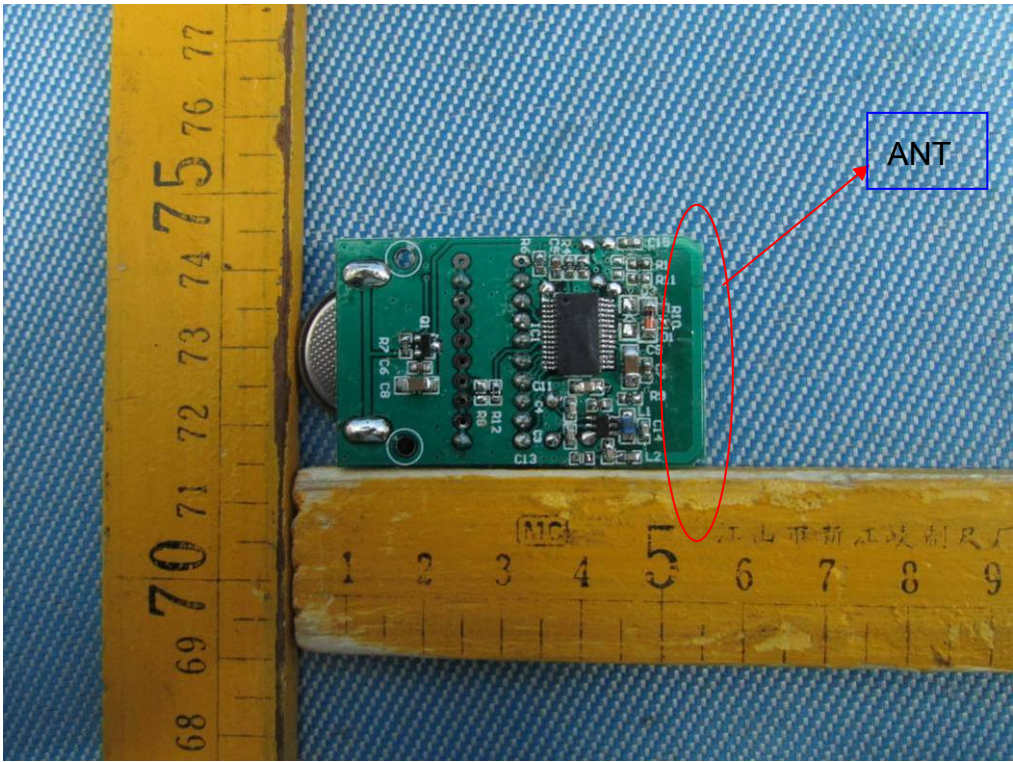
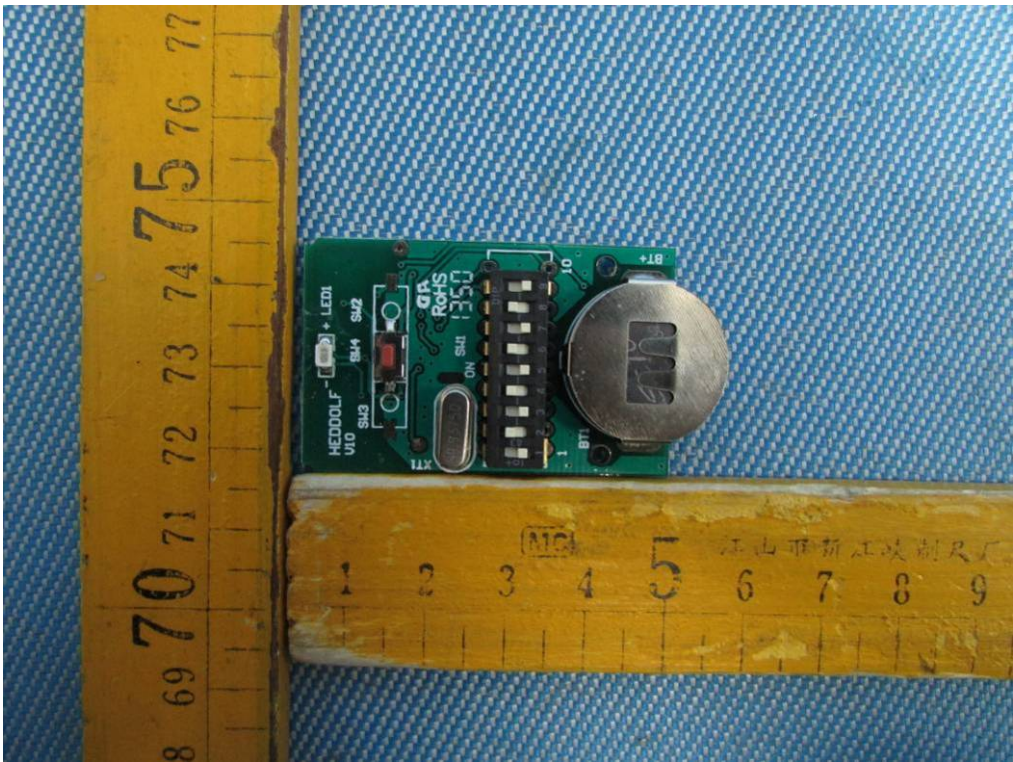
L219



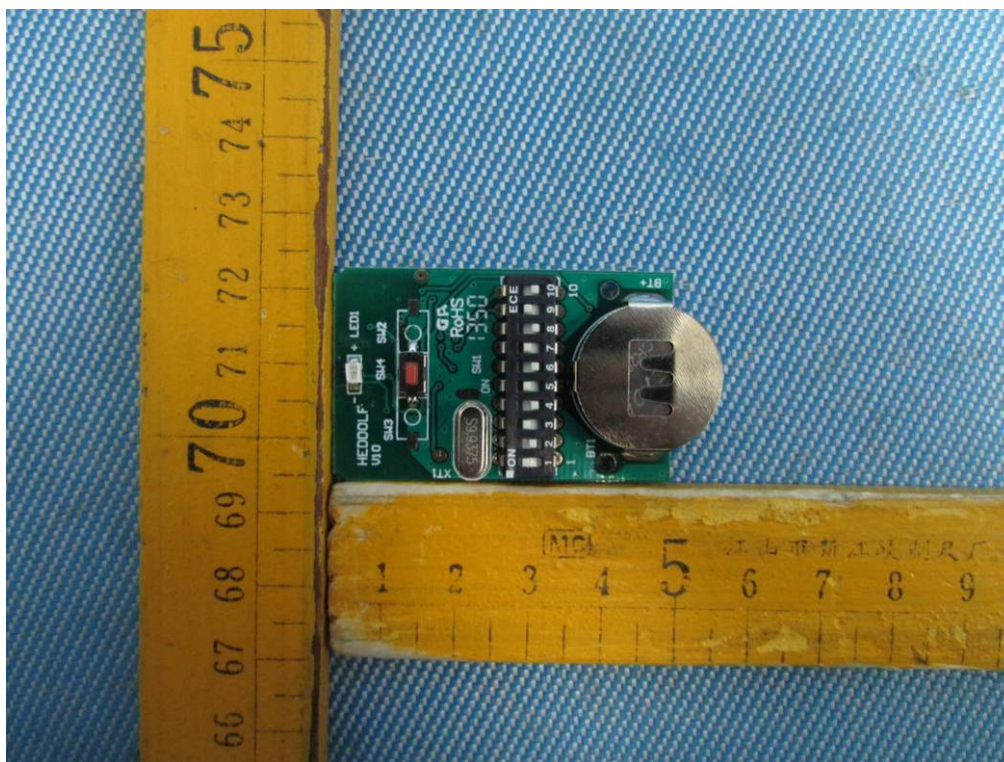
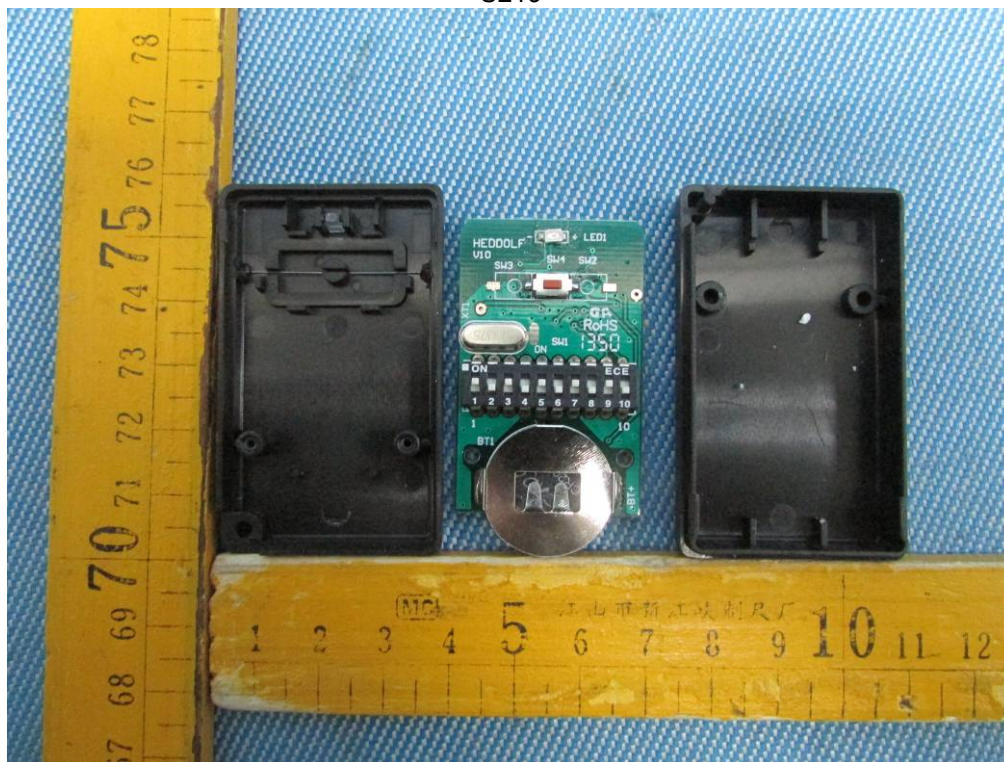


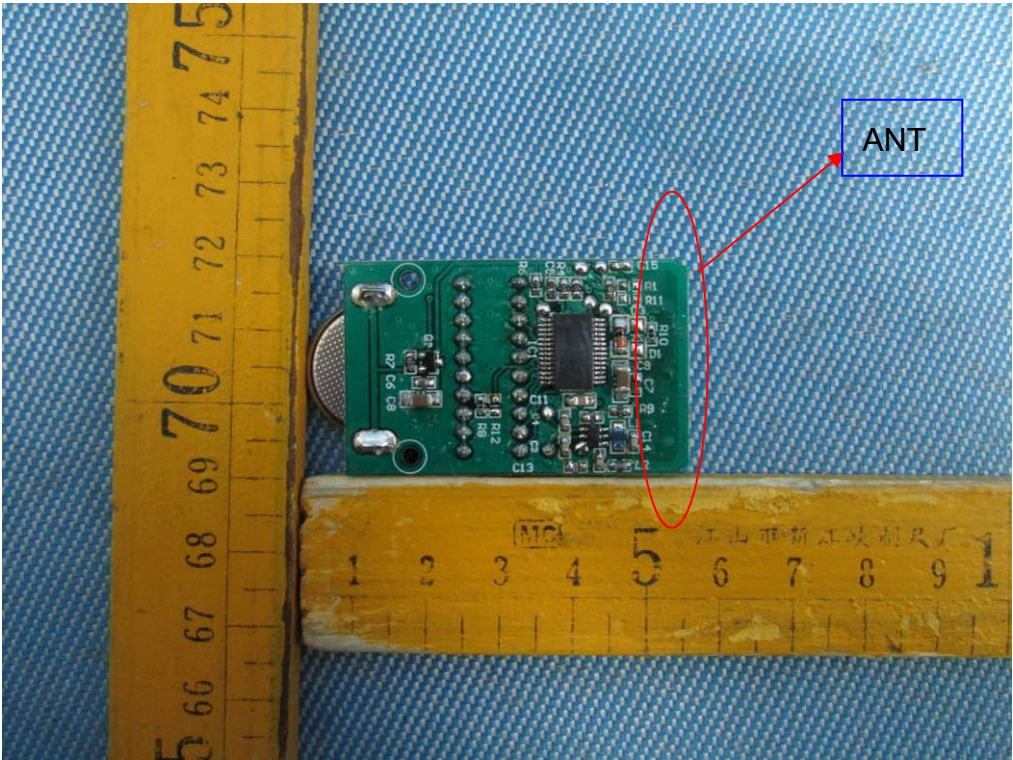
P219-1



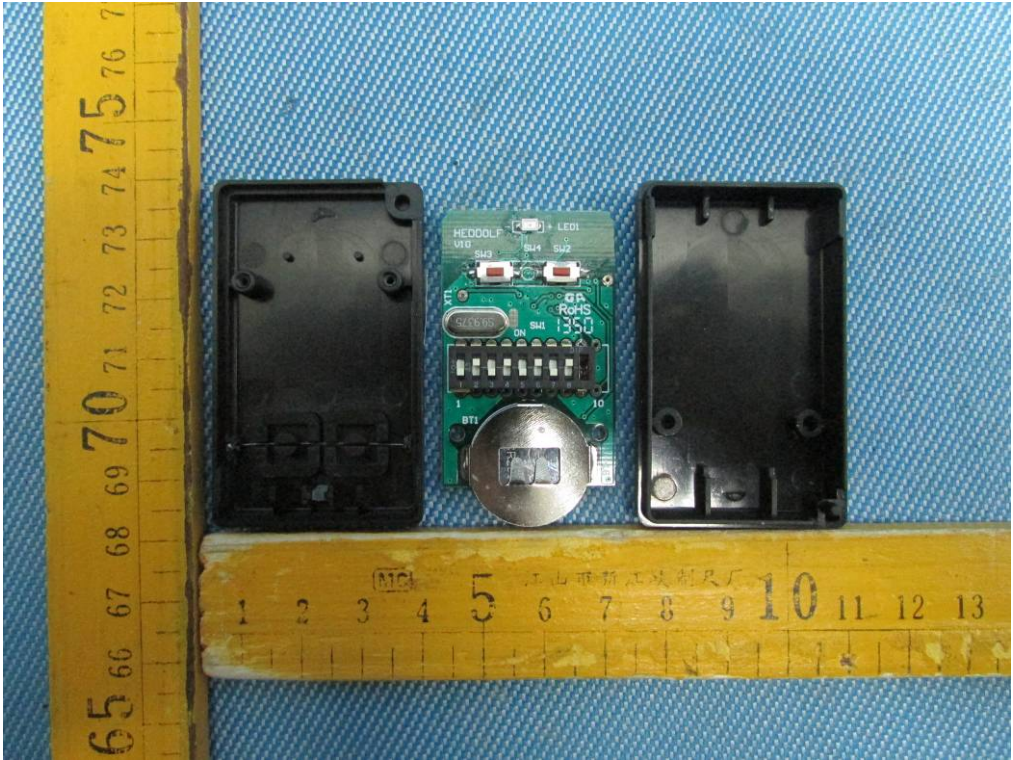


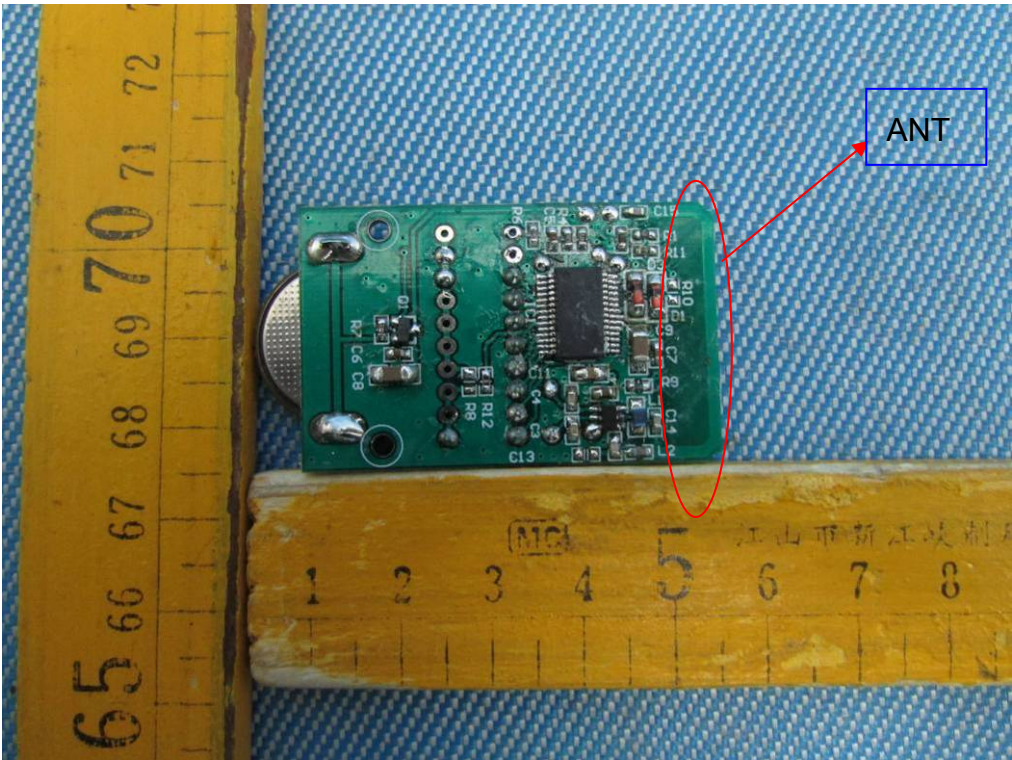
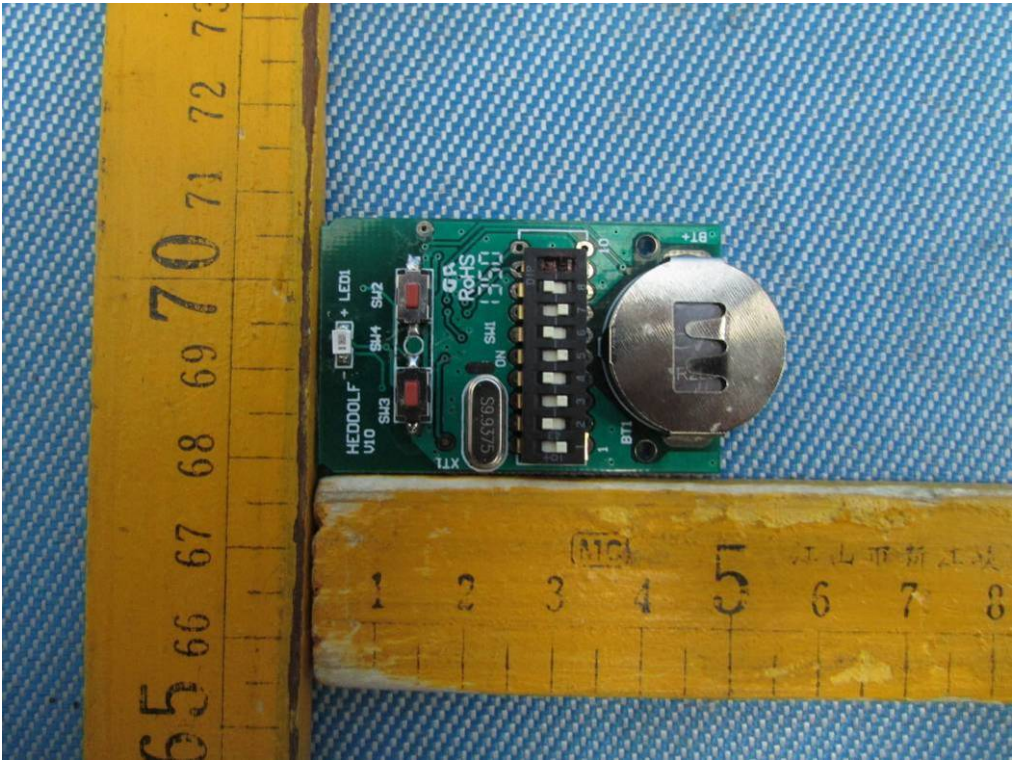
S219

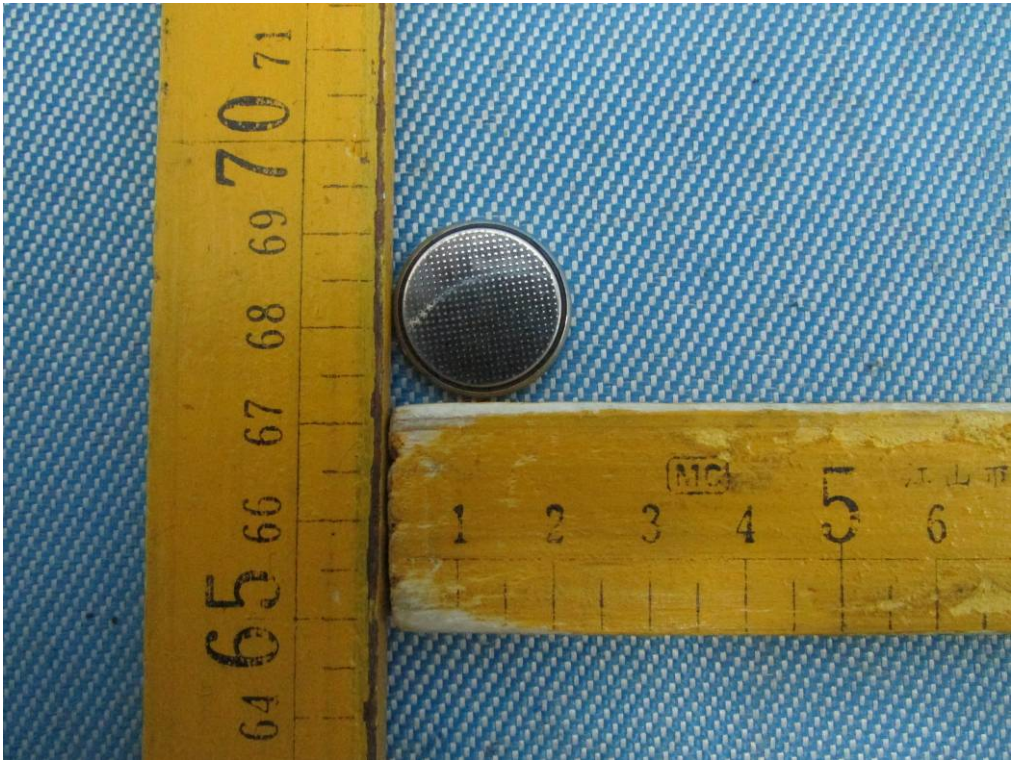




P219-2







=====End of Test Report=====