



RADIO TEST REPORT

ETSI EN 300 330 V2.1.1 (2017-02)

Product: Wireless Cycle Computer
Trade Name: ISPORT
Model Name: C016A
Serial Model: C016, C015, C015A
Report No.: BCTC-LH181103077-3E

Prepared for

Million Concept Electronic (Shenzhen) Co., Ltd.
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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name..... : Million Concept Electronic (Shenzhen) Co., Ltd.
Address : No.98 Xiashanmen Road, Songgang Town, Baoan District, Shenzhen City, China
Manufacture's Name : Million Concept Electronic (Shenzhen) Co., Ltd.
Address : No.98 Xiashanmen Road, Songgang Town, Baoan District, Shenzhen City, China

Product description

Product name : Wireless Cycle Computer
Trademark : ISPORT
Model and/or type reference ... : C016A
 C016, C015, C015A

Standards : ETSI EN 300 330 V2.1.1 (2017-02)

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with 2014/53/EU RED Directive Art.3.2 requirements. And it is applicable only to the tested sample identified in the report.

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Remark: All test data come from the report of No. BCTC-LH170501908-3E.

Date of Test..... :

Date (s) of performance of tests..... : May, 12 – May, 17, 2017

Date of Issue : Nov. 16, 2018

Test Result : **Pass**

Prepared by(Engineer): Willem Wang

Willem Wang

Reviewer(Supervisor): Eric Yang

Eric Yang

Approved(Manager): Carson Zhang

Carson Zhang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen BCTC Testing Co., Ltd.



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1.1 Compliance with ETSI EN 300 330 V2.1.1

Clause	Description of Test Item	Remarks	Results
Transmitter Parameters			
7.2	Transmitter carrier output levels		Pass
7.3	Permitted range of operating frequencies		Pass
7.4	frequency range of the modulation bandwidth		N/A
7.5	Transmitter spurious		Pass
Receiver Parameters			
8.1	Adjacent channel selectivity	category 1 only	N/A
8.2	Blocking or desensitiation	category 1 or 2 only	N/A
8.3	Receiver spurious emissions		Pass

1.2 Measurement Uncertainty

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	Radiated Emission Test	±3.17dB
3	RF power,conducted	±0.16dB
4	Spurious emissions,conducted	±0.21dB
5	All emissions,radiated(<1G)	±4.68dB
6	All emissions,radiated(>1G)	±4.89dB



2 General Information

2.1 General Description of EUT

EUT Name:	Wireless Cycle Computer
Model No:	C016A C016, C015, C015A.
Trademark:	ISPORT
Operation frequency:	125kHz
Receiver categories	3
Channel Number:	2
Modulation Technology:	MSK
Antenna Assembly Gain:	N/A
Power Supply Range:	DC 3V (From Battery)

2.2 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagrams)



2.3 Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A



2.4 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2016.12.14	2017.12.14
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2016.12.14	2017.12.14
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2016.12.14	2017.12.14
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2016.12.14	2017.12.14
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2016.12.14	2017.12.14
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120A	451	2016.12.14	2017.12.14
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.12.14	2017.12.14
8	EMI Test Receiver	R&S	ESCI	100124	2016.12.14	2017.12.14
9	LISN	Kyoritsu	KNW-242	8-837-4	2016.12.14	2017.12.14
10	LISN	Kyoritsu	KNW-407	8-1789-3	2016.12.14	2017.12.14
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.12.14	2017.12.14
12	MXG analog signal generator	Agilent	N5181A	MY46240859	2016.12.14	2017.12.14
13	Power Meter	R&S	NRVS	101336	2016.12.14	2017.12.14
14	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2016.12.14	2017.12.14
15	Multimeter	UNI-T	UT52	3080008236	2016.12.14	2017.12.14
16	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
17	Loop Antenna	ARA	PLA-1030/B	1029	2016.12.14	2017.12.14



3 ETSI EN 300330 Test Result of Transmitter parameters

3.1 Transmitter carrier output levels

3.1.1 Limit

1. H-field (radiated)

The limits presented in the present document are the required field strengths to allow satisfactory operation of inductive systems.

The limit for a low level generic H-field strength is given in annex H.

The maximum H-field strengths for certain frequency bands are given in table 5. Field-strength limits of National Radio Interfaces (NRI) apply.

Frequency range (MHz)	H-field strength limit (H _f) dBμA/m at 10 m (note 8)
0,009 ≤ f < 0,090	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
0,09 ≤ f < 0,119	42
0,119 ≤ f < 0,135	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
0,135 ≤ f < 0,140	42
0,140 ≤ f < 0,1485	37,7
0,1485 ≤ f < 30	-5 (see note 4)
0,315 ≤ f < 0,600	-5
3,155 ≤ f < 3,400	13,5
4,234	9
4,516	7
7,400 ≤ f < 8,800	9
10,2 ≤ f < 11,00	9
12,5 ≤ f ≤ 20	-7
6,765 ≤ f ≤ 6,795 13,553 ≤ f ≤ 13,567 26,957 ≤ f ≤ 27,283	42 (see notes 3 and 9)
13,410 ≤ f ≤ 13,553, 13,567 ≤ f ≤ 13,710	9 (see note 6)
13,110 ≤ f ≤ 13,410, 13,710 ≤ f ≤ 14,010	-3,5 (see note 6)
12,660 ≤ f ≤ 13,110, 14,010 ≤ f ≤ 14,460	-10 (see note 6)
11,810 ≤ f ≤ 12,660, 14,460 ≤ f ≤ 15,310	-16 (see note 6)
13,460 ≤ f ≤ 13,553, 13,567 ≤ f ≤ 13,660	27 (see note 7)
13,360 ≤ f ≤ 13,460, 13,660 ≤ f ≤ 13,760	Linear transition from 27 to -3,5 (see note 7)
13,110 ≤ f ≤ 13,360, 13,760 ≤ f ≤ 14,010	-3,5 (see note 7)
12,660 ≤ f ≤ 13,110, 14,010 ≤ f ≤ 14,460	-5 (see note 7)
13,553 ≤ f ≤ 13,567	60 (see notes 2 and 3)
27,095	42

NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBμA/m:

- for loop coil antennas with an area ≥ 0,16 m² this table and table 5 with the antenna limitations apply;
- for loop coil antennas with an area between 0,05 m² and 0,16 m² table 5 applies with a correction factor. The limit is: table value + 10 × log (area/0,16 m²);
- for loop coil antennas with an area < 0,05 m² the limit is 10 dB below table 5.

NOTE 2: For RFID and EAS applications only.

NOTE 3: Spectrum mask limit, see annex G.

NOTE 4: For further information see annex H.

NOTE 5: Limit is 42 dBμA/m for the following spot frequencies:
60 kHz ± 250 Hz, 66,6 kHz ± 750 Hz, 75 kHz ± 250 Hz, 77,5 kHz ± 250 Hz,
and 129,1 kHz ± 500 Hz.

NOTE 6: Only in conjunction with spectrum mask, see clause G.3.

NOTE 7: Only in conjunction with spectrum mask, see clause G.4.

NOTE 8: The H-field strength limits (H_f) in dBμA/m at 10 m distance of a Wireless Power Transfer System in the declared working situations.

NOTE 9: The frequency range 6,765 MHz - 6,795 MHz is not a harmonized ISM frequency band according article 5.138 of the ITU Radio Regulations [i.26]. For the decision scheme in table 3 only Case 2 may therefore be applicable in some countries.



2. RF carrier current (Product Class 3 only)

This applies to Product Class 3 only.

RF carrier current is defined as the current delivered to an artificial load under specified conditions of measurement. The manufacturer shall declare the maximum antenna loop size.

Table 6: Limit for RF carrier current × antenna area (for Product Class 3 only)

Frequency range (MHz)	RF carrier current × antenna area, dBAm ²
0,009 ≤ f < 0,135	40 descending 3 dB/oct above 30 kHz (see note)
NOTE: Limit is 10 dBAm ² for the following spot frequencies: 60 kHz ± 250 Hz, 75 kHz ± 250 Hz, 77,5 kHz ± 250 Hz and 129,1 kHz ± 500 Hz.	

3. Radiated E-field (Product Class 4 only)

The radiated E-field is defined as the E-field in the direction of maximum field strength under the specified conditions of measurement. This is defined for a transmitter with an integral antenna.

In the frequency range 9 kHz to 4,78 MHz, the limits of Hef follow the H-fields limits, Hf, as given in clause 7.2.1.3, table 4 with an additional correction factor C. The factor given below is specific for a 10 m measuring distance.

The limit Hef = Hf + C

where: $C = 20 \times \log(f_c / 4,78 \times 10^6)$ dB;

and where:

fc is the carrier frequency in Hz.

For a graphical representation of the correction factor C see annex B.

In the frequency range 4,78 MHz to 25 MHz limits are identical to the limits in clause 7.2.1.3, table 4, without any correction factor.

3.1.2 Test procedure

The tests defined in clauses 7.2.1.2, 7.2.2.2 or 7.2.3.2

3.1.3 Test record

Frequency (kHz)	Measure Level (dBuA/m)	Limit (dBuA)	Margin (dB)	Antenna Polarization	Detector Type
110.00	37.01	52.00	-14.99	Vertical	PEAK
110.00	35.71	52.00	-16.29	Horizontal	PEAK
205.00	40.19	52.00	-11.81	Vertical	PEAK
205.00	39.86	52.00	-12.44	Horizontal	PEAK

3.2 Permitted range of operating frequencies

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate.

3.2.1 Limit

The permitted range of operating frequency for intentional emissions shall be from 9 kHz to 30 MHz. Outside the permitted range of operating frequencies the unintentional emissions shall be reduced to the limits given in clause 7.5.

3.2.2 Test procedure

The occupied bandwidth of the EUT, e.g. the minimum and maximum output frequencies at which the permitted spurious and out-of-band emission levels as specified in clause 7.5 are exceeded due to intentional emission from the radio transmitter shall be measured using the method shown in figure 1. If more than one modulation scheme can be generated by the EUT, then for each modulation scheme and one typical set of modulation parameters the maximum and minimum frequencies shall be measured and recorded separately.

The measuring receiver may be a spectrum analyser, oscilloscope, selective power meter or any measuring receiver which is appropriate to perform the intended measurement of the EUT.

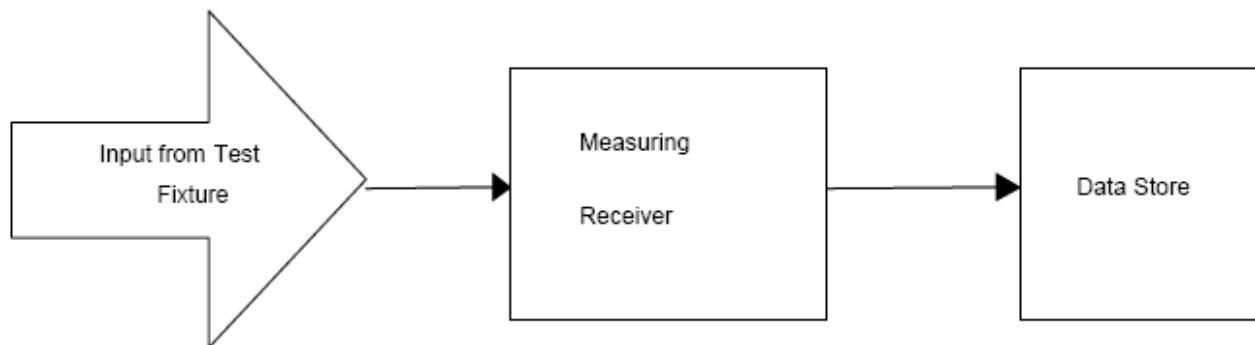


Figure 1: Test set-up for measuring the operating frequency range

3.2.3 Test result

The EUT is operating on 110-205kHz, so it is fulfill the limit.



3.3 Permitted range of the modulation bandwidth

The frequency range of the modulation bandwidth contains all associated side bands above the following level

- a) For carrier frequencies below 135 kHz:
 - 23 dB below the carrier, for RFID within the transmitter emission boundary of figure G.1, and for RFID and EAS systems within the transmitter mask of figure G.2 or the appropriate spurious limit as defined in clause 7.5.
- b) For carrier frequencies in the range 135 kHz to 30 MHz:
 - 15 dB below the carrier or the appropriate spurious limit as defined in clause 7.5.

Where the assigned frequency band has been divided into sub-bands by the regulatory body, the above measuring levels and bandwidths apply inside these sub-bands

3.3.1 Limits

The permitted range of the modulation bandwidth shall be within the assigned frequency band see table 1 or $\pm 7,5$ % of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the permitted modulation bandwidth shall be within the transmitter emission boundary of figure G.1, respectively the spectrum mask of figure G.2.

3.3.2 Test procedure

The transmitter shall be connected to an artificial antenna or if the transmitter has an integral antenna a test fixture shall be used (see clause 6.3). The RF output of the equipment shall be connected to a spectrum analyser via a 50 Ω variable attenuator.

The transmitter shall be operated at the nominal carrier power or field strength measured under normal test conditions in clause 7.2. The attenuator shall be adjusted to an appropriate level displayed at the spectrum analyser screen. The transmitter shall be modulated with standard test modulation (see clauses 6.1.1 and 6.1.2). If the equipment cannot be modulated externally, the internal modulation shall be used.

For transmitters using a continuous wideband swept carrier the measurement shall be made with the sweep on. The output of the transmitter, with or without test fixture, shall be measured by using a spectrum analyser with a resolution bandwidth appropriate to accept all major side bands. The power level calibration of the spectrum analyser shall then be related to the power level or field strength measured in clause 7.2. The calculation will be used to calculate the absolute level of the sideband power.

The frequency of the upper and lower points, where the displayed power envelope of the modulation including frequency drift is equal to the appropriate level defined in clause 7.3.1 is recorded as the modulation bandwidth. The measurements shall be made during normal and extreme test conditions. During extreme test conditions, both extreme temperature and voltage apply simultaneously, (clauses 5.4.1 and 5.4.2 applied simultaneously).

3.3.3 Test record

N/A



3.4 Transmitter spurious

Spurious domain emission limits are limits on emissions at frequencies other than those of the carrier and sidebands associated with normal test modulation (clause 6.1). The level of spurious emissions shall be measured at normal conditions (clause 5.3) as either:

- 1: a) their power or current level in an artificial antenna (conducted spurious emission); and
b) their effective radiated power or field strength when radiated by the cabinet and structure of the equipment (cabinet radiation); or
- 2: their effective radiated power or field strength when radiated by the cabinet and the integral antenna.

3.4.1 Limit

The power of any spurious emission, conducted or radiated, shall not exceed the following values given in table 4.

Table 4: Limits

Frequency State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operating	4 nW	250 nW	1 μ W
Standby	2 nW	2 nW	20 nW

3.4.2 Test procedure

3.4.2.1 Radiated method

- (1) Put the EUT on the support in its standard position with associated equipment and switched on.
- (2) The test antenna shall be raised or lowered, the transmitter shall be rotated through 360° until a higher maximum signal is received, and shall be performance at vertical and horizontal polarization. This level shall be recorded.
- (3) the substitution antenna shall replace the transmitter antenna in the same position and in same polarization. The frequency of the signal generator shall be adjusted to the measurement frequency. The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the test receiver;
- (4) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.



3.4.3 Test result

Tx				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
61.11	Vertical	-69.04	-36.00	Pass
101.24	V	-71.05	-36.00	
117.09	V	-73.44	-54.00	
317.11	V	-75.39	-36.00	
516.02	V	-72.08	-54.00	
611.03	V	-36.10	-54.00	
911.23	V	-50.17	-36.00	
1606.46	V	-31.08	-30.00	
2012.40	V	-32.09	-30.00	
3101.10	V	-31.87	-30.00	
130.06	Horizontal	-69.88	-36.00	
201.12	H	-70.41	-54.00	
355.09	H	-71.71	-36.00	
483.02	H	-72.06	-54.00	
671.06	H	-70.41	-54.00	
820.53	H	-36.08	-36.00	
1701.10	H	-31.51	-30.00	
2410.70	H	-31.01	-30.00	
3181.10	H	-33.04	-30.00	
Tx in standby Mode				
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)				



4 ETSI EN 300330 Test Result of Receiver parameters

4.1 Spurious emissions

4.1.1 Limits

1. Radiated emissions below 30 MHz

Table 12: Receiver spurious radiation limits

Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

2. Radiated emissions above 30 MHz
The power of any spurious emission shall not exceed 2 nW

4.1.2 Test procedure

4.1.2.1 Radiated method

- (1) Put the EUT on the support in its standard position with associated equipment and switched on.
- (2) The test antenna shall be raised or lowered, the transmitter shall be rotated through 360° until a higher maximum signal is received, and shall be performance at vertical and horizontal polarization. This level shall be recorded.
- (3) the substitution antenna shall replace the transmitter antenna in the same position and in same polarization. The frequency of the signal generator shall be adjusted to the measurement frequency. The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the test receiver;
- (4) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range.



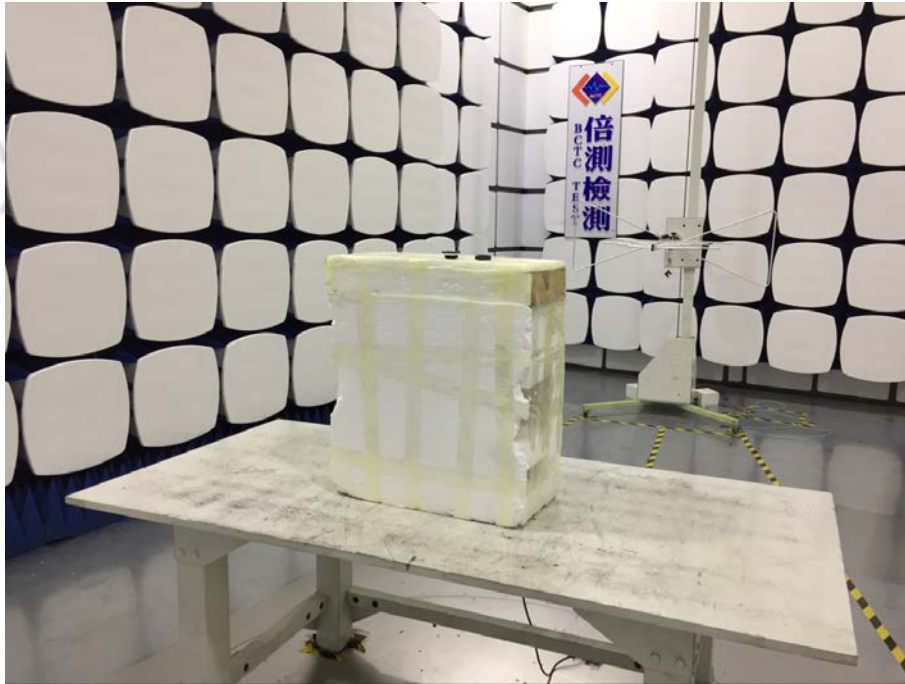
4.1.3 Test result

RX					
Frequency (MHz)	Spurious Emission		Limit (dBuA/m)	Test Result	
	polarization	Level(dBuA/m)			
0.173	Vertical	-70.01	-44.23	Pass	
0.217	V	-71.06	-41.58		
0.209	V	-73.09	-41.27		
0.390	V	-75.07	-38.62		
0.601	V	-73.19	-36.89		
0.780	V	-70.14	-35.66		
12.02	V	-69.24	-25.00		
0.109	Horizontal	-70.20	-44.23		
0.238	H	-68.81	-41.58		
0.197	H	-70.48	-41.27		
0.381	H	-71.05	-38.62		
0.601	H	-70.11	-36.89		
0.7940	H	-68.78	-35.66		
Tx in standby Mode					
N/A: Not applicable, since the spurious emission of the EUT is too weak to be detected.(≤-80dBm)					

Remark:



4.2 EUT TEST Photos



4.3 Photos of the EUT

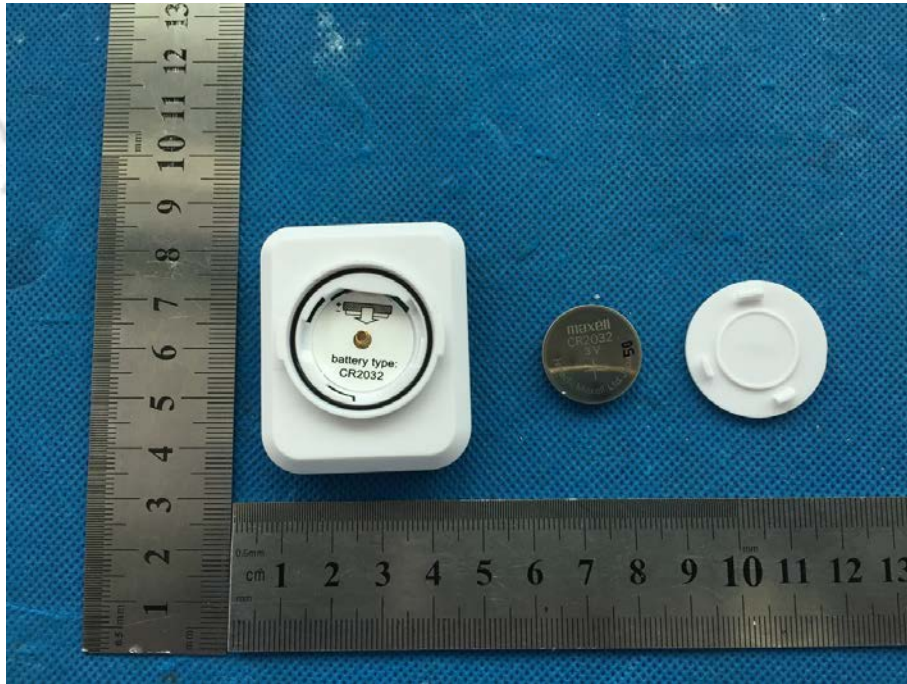
EUT Photo 1



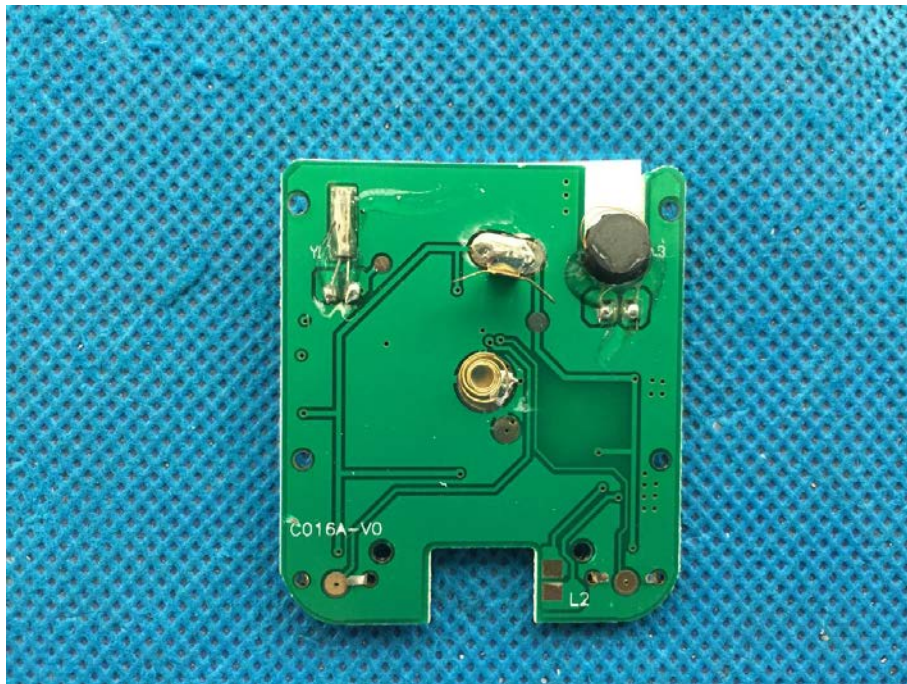
EUT Photo 2



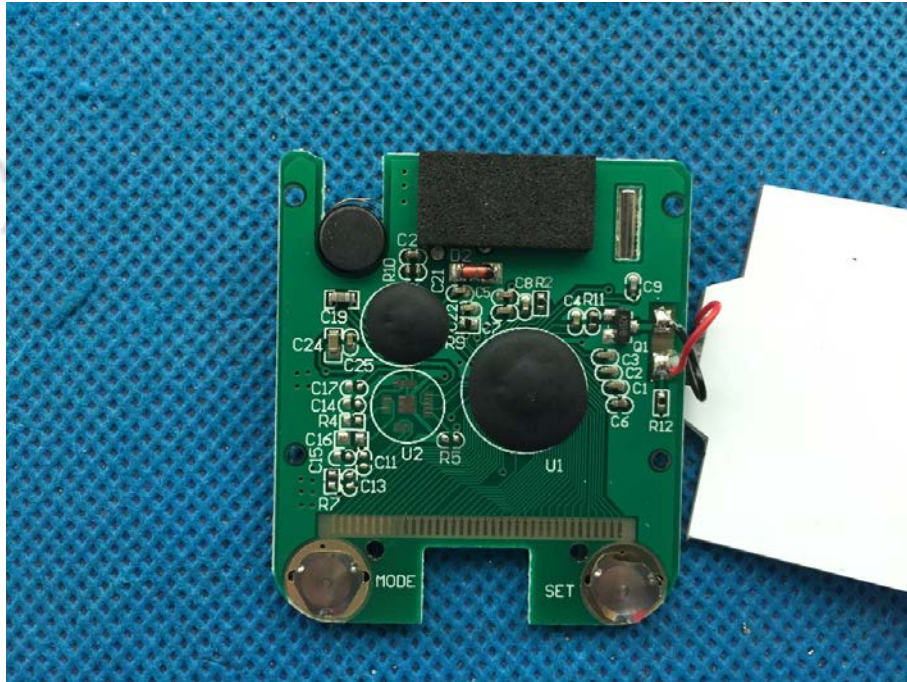
EUT Photo 3



EUT Photo 4



EUT Photo 5



***** END OF REPORT *****