



Shenzhen CTL Testing Technology Co., Ltd.  
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# TEST REPORT

## Ordinance Article 2 paragraph 1 item (19)

Report Reference No. : CTL1912244011-MIC

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Ivan Xie

Product Name : Bluetooth Module

Model/Type reference : ENDO-07S

List Model(s) : N/A

Trade Mark : N/A

Applicant's name : 株式会社遠藤照明(ENDO LIGHTING CORP.)

Address of applicant : 〒577-0065 大阪市中央区備後町 1-7-3 (1-7-3, Bingo-machi, tyuouu-ku, Osaka-city, Osaka, 541-0051, Japan)

Test Firm : Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm : Floor 1-A, Baisha Technology Park, No.3011, Shaheji Road, Nanshan District, Shenzhen, China 518055

Test specification :

Standard : Ordinance Article 2 paragraph 1 item (19)

TRF Originator : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF : Dated 2011-01

Date of receipt of test item : Jan. 03, 2020

Date of sampling : Jan. 03, 2020

Date of Test Date : Jan. 03, 2020–Mar. 12, 2020

Data of Issue : Mar. 13, 2020

Result : Pass

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# TEST REPORT

<b>Test Report No. :</b> CTL1912244011-MIC	Mar. 13, 2020 Date of issue
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Equipment under Test : Bluetooth Module

Model /Type : ENDO-07S

Listed Models : N/A

**Applicant** : 株式会社遠藤照明(ENDO LIGHTING CORP.)

**Address** : 〒577-0065 大阪市中央区備後町 1-7-3 (1-7-3,  
Bingo-machi, tyuuou-ku, Osaka-city, Osaka, 541-0051,  
Japan)

**Manufacturer** : TAITO ELECTRICAL APPLIANCE CO., LTD

**Address** : The Third Industrial Area, Xin Ye six Street, XiaBian,  
ChanAn, DongGuan, China

<b>Test result</b>	<b>Pass *</b>
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\* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

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## 1. SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

[MIC Notice No.88 Appendix No.43](#)

### 1.2. Test Description

Test Item	Result
Frequency Error	Pass
Antenna Output Power and Output Power Tolerance	Pass
Occupied Bandwidth and Spread spectrum bandwidth	Pass
Dwell time	N/A Note 1
Unwanted Emission Strength	Pass
Secondary Radiated Emission Strength	Pass
Construction protection method	Pass
Interference Prevention Function	Pass

Note1: Only applicable to FHSS system.



### 1.3. Test Facility

#### 1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shaheji Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

#### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

##### **CNAS-Lab Code: L7497**

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No. 4343.01**

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **IC Registration No.: 9618B**

##### **CAB identifier: CN0041**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

##### **FCC-Registration No.: 399832**

##### **Designation No.: CN1216**

Shenzhen CTL Testing Technology 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 399832, December 08, 2017.

### 1.4. Measurement Uncertainty

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR100028-1 [2] and shall correspond to an expansion factor (coverage factor)  $K=1.96$  or  $K=2$  (which provide confidence levels of respectively 95% and 95.5% in the case where the distributions characterizing the actual measurement uncertainties are normal.

Parameter	Uncertainty
Frequency error / 99%&90% bandwidth	$\pm 1.62 \times 10^{-6}$
Total RF power, conducted	$\pm 0.8\text{dB}$
Spurious emissions, conducted	$\pm 0.8\text{dB}$
DC and low frequency voltages	$\pm 0.05\%$
Humidity	$\pm 5\%$
Temperature	$\pm 1^\circ\text{C}$

## 2. GENERAL INFORMATION

### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Voltage	Normal Voltage	DC 3.3V
	High Voltage	DC 3.8V
	Low Voltage	DC 2.8V
Other	Normal Temperature	25°C
	Relative Humidity	55 %
	Air Pressure	989 hPa

Note : As the EUT was powered by DC 3.3V, and output voltage float not exceed  $\pm 1\%$  when working on extreme voltage, so all test performed at nominal input voltage only.

### 2.2. General Description of EUT

Product Name:	Bluetooth Module
Model/Type reference:	ENDO-07S
Power supply:	DC 3.3V
Hardware version:	V3.2
Software version:	V1.0
<b>BLE:</b>	
Supported type:	Bluetooth low Energy
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Antenna type:	PCB Antenna
Antenna gain:	-0.50dBi

Note: For more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

## 2.3. Description of Test Modes

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

### Operation Frequency List :

Channel	Frequency (MHz)
00	2402
01	2404
02	2406
⋮	⋮
19	2440
⋮	⋮
37	2476
38	2478
39	2480

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

## 2.4. Measurement Instruments List

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum Analyzer	Agilent	N9020A	US46220290	2019/05/20	2020/05/19
2	Spectrum Analyzer	Keysight	N9020A	MY53420874	2019/05/20	2020/05/19
3	Signal generator	Agilent	N5182A	MY50142850	2019/05/20	2020/05/19
4	Signal Generator	Agilent	N5182A	MY52420355	2019/05/20	2020/05/19

Note: Calibration by the calibration agencies listed in the table correspond to paragraph 4 (ii) (c) of Article 24-2 in the Radio Law".



### 3. Test conditions and Results

#### 3.1. Frequency Error

##### LIMIT

±50ppm

##### TEST CONFIGURATION



##### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: non-modulation

Spectrum Condition:

- Frequency: test frequency
- Span: 1 MHz
- RBW: 10 KHz
- VBW: 10 KHz
- Sweep time: Auto
- Detector mode: Positive peak
- Indication mode: max hold

##### TEST RESULTS

Raw data reference to annex for BLE section 1.

### 3.2. Antenna Output Power and Output Power Tolerance

#### LIMIT

- $\leq 3 \text{ mW /MHz}$  (FHSS from 2402-2480 MHz)
- $\leq 10 \text{ mW/MHz}$  (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW}$  (other from 2400-2483.5 MHz)

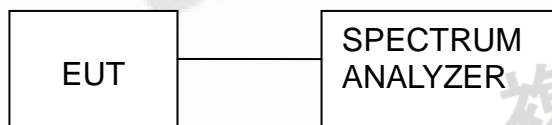
The Output Power Tolerance must be within +20%, -80%.

E.i.r.p:

- $\leq 12.14 \text{ dBm/MHz}$  (OFDM, DS form 2400-2483.5 MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

#### TEST CONFIGURATION



#### TEST PROCEDURE

Step 1:

Connect the UUT to the spectrum analyzer as TEST CONFIGURATION and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz
- VBW: 1 MHz
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak
- Trace Mode: Max Hold

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyzer:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 0 MHz
- RBW: 1 MHz
- VBW: 1 MHz
- Detector: RMS
- Trace Mode: Clear Write

#### TEST RESULTS

Raw data reference to annex for BLE section 3.

### 3.3. Occupied Bandwidth And Spreading Bandwidth

#### LIMIT

- Occupied bandwidth: FH $\leq$ 83.5 MHz; OFDM $\leq$ 38 MHz, DS $\leq$ 26 MHz; Others $\leq$ 26 MHz
- Spread Bandwidth: $\geq$  500 kHz(FH,DS)
- Spread factor $>$ 5.

#### TEST CONFIGURATION



#### TEST PROCEDURE

1. Setting of SA is following as follow:
  - RBW: under 3% of OBW
  - VBW: = RBW
  - Sweep time: Auto
  - Sweep Mode: Continuous sweep
  - Detect mode: Positive peak
  - Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 90% of occupied bandwidth to measure spread bandwidth.
4. Spread Factor=Spread Bandwidth/modulation rate. The modulation rate: MR=1Mbps (declare by client)

#### TEST RESULTS

Raw data reference to annex for BLE section 2.

### 3.4. Unwanted Emission Strength

#### LIMIT

Below 2387 MHz: 2.5 $\mu$ W/MHz or less

2387 to 2400 MHz: 25 $\mu$ W/MHz or less

2483.5 Through 2496.5 MHz: 25 $\mu$ W/MHz or less

Over 2496.5 MHz: 2.5 $\mu$ W/MHz or less

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

- Frequency: 30MHz-13GHz
- RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)
- VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)
- Sweep time: Auto
- Detector mode: Positive peak
- Indication mode: max hold

#### TEST RESULTS

Raw data reference to annex for BLE section 4.

### 3.5. Secondary Radiated Emission Strength

#### LIMIT

Below 1GHz: 4.0nW or less

Above 1GHz: 20nW or less

#### TEST CONFIGURATION



#### TEST PROCEDURE

The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

EUT Condition: modulation

Spectrum Condition:

- Frequency: 30MHz-13GHz
- RBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)
- VBW: 100 KHz (30MHz-1GHz), 1MHz (1GHz-12.5GHz)
- Sweep time: Auto
- Detector mode: Positive peak
- Indication mode: max hold

#### TEST RESULTS

Raw data reference to annex for BLE section 5.



### 3.6. Construction protection method

#### Requirement

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily

#### Confirmation method

And all high-frequency section and modulation section was packaged in one IC.

### 3.7. Interference Prevention Function

#### Requirement

Clarify, the one automatically to transmit and to receive identification code with the wireless equipment of the wireless station used in the same premises.

#### Interference Prevention Function Confirm

A communication link was made where the ID code is correct (Identical).

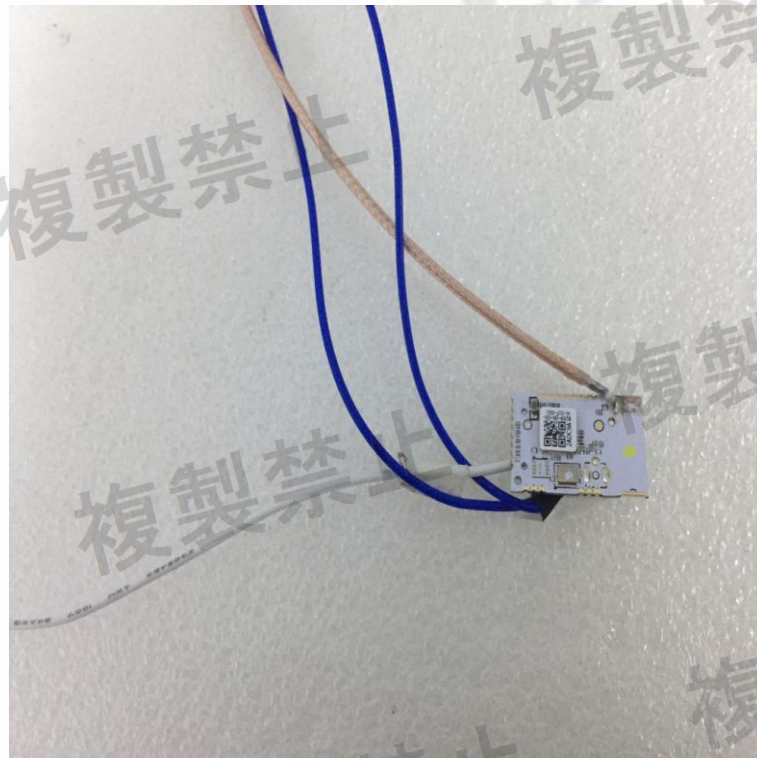
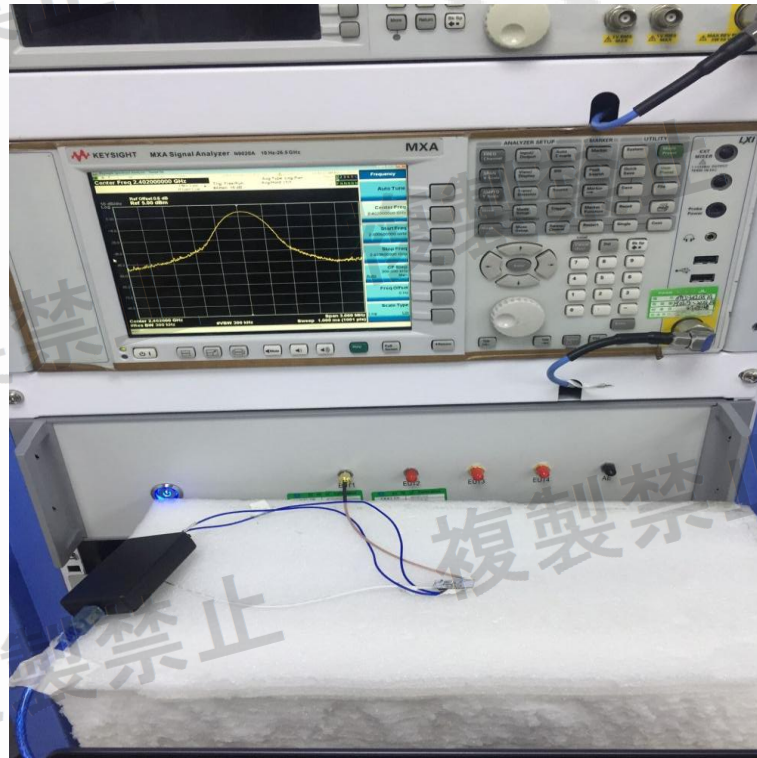
#### TEST PROCEDURE

1. Connect the EUT in network
2. Open the software
3. We can get the information as follows:

#### TEST RESULTS

BT MAC:BC:03:F6:13:00:25

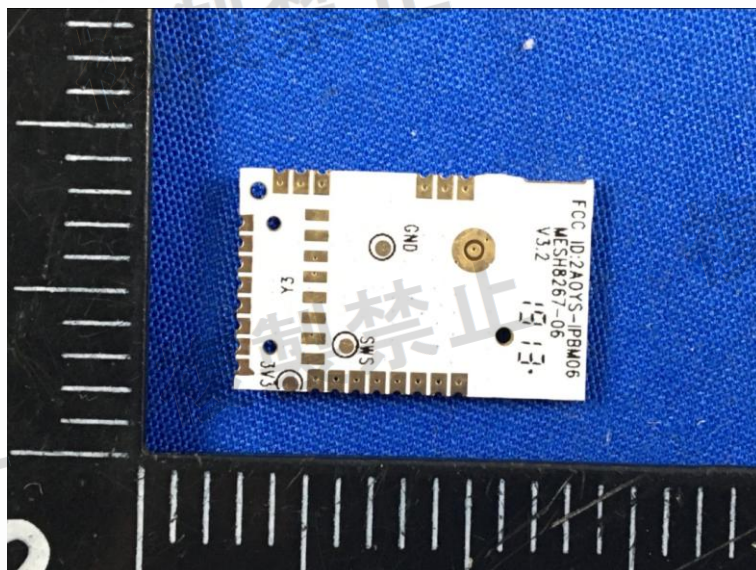
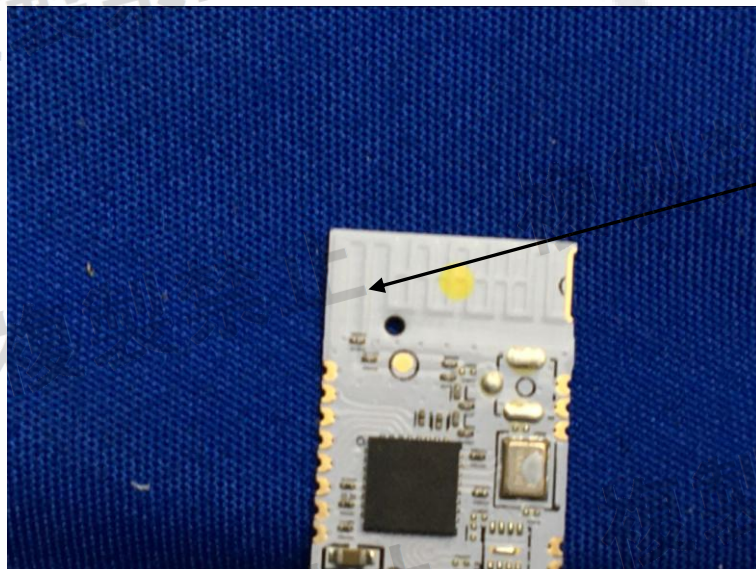
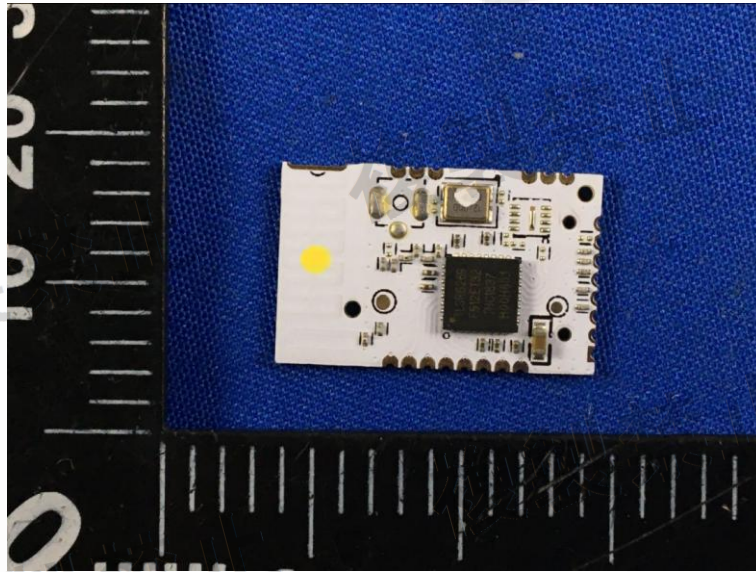
#### 4. Test Setup Photos of the EUT





## 5. External and Internal Photos of the EUT

### External and Internal Photos of the EUT



\*\*\*\*\*THE END\*\*\*\*\*