



# **RADIO TEST REPORT**

**For**

**Meteca SA**

**MBC-WB**

Model Number : MBC-WB01

Prepared for : Meteca SA

Via alla Torre 2, 6850 Mendrisio ,Switzerland

Prepared By : Shenzhen STL Testing Technology Co., Ltd.

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Report No. : STL2019E032672-R3

Date of Test : Mar.28-Apr.28 .2019

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## TABLE OF CONTENTS

### Test Report Declaration

1. GENERAL INFORMATION .....	4
2. TEST RESULTS SUMMARY .....	6
3. TEST EQUIPMENTS.....	7
4. MEASUREMENT UNCERTAINTY.....	8
5. EN 300 328 §4.3.1.2 - RF Output Power .....	9
6. EN 300 328 §4.3.1.4 - Accumulated Transmit Time, Frequency Occupation and Hopping Sequence.....	11
7. EN 300 328 §4.3.1.5 - Hopping Frequency Separation.....	14
8. EN 300 328 §4.3.1.8 - Occupied Channel Bandwidth.....	16
9. EN 300 328 §4.3.1.9 - Transmitter unwanted emissions in the out-of-band domain.....	17
10. EN 300 328 §4.3.1.10 - Transmitter unwanted emissions in the spurious domain.....	19
11. EN 300 328 §4.3.1.11 – Receiver spurious emissions.....	20
APPENDIX I (Photos of the EUT) .....	21



## TEST REPORT DECLARATION

Applicant	Meteca SA
Address	Via alla Torre 2, 6850 Mendrisio ,Switzerland
Manufacturer	Meteca SA
Address	Via alla Torre 2, 6850 Mendrisio ,Switzerland
EUT Description	MBC-WB
Model Number	MBC-WB01

## Test Standards:

ETSI EN 300 328 V2.2.0 (2017-11)

The EUT described above is tested by Shenzhen STL Testing Technology Co., Ltd. EMC Laboratory to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen STL Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Date of Test:

Mar.28-Apr.28 .2019

Prepared by:

Eris

Project Engineer

Reviewed by:

Lewis

Project Manager

Approved by:



Technical Director

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

Description : MBC-WB

Model Number : MBC-WB01

Applicant : Meteca SA  
Via alla Torre 2, 6850 Mendrisio ,Switzerland

Manufacturer : Meteca SA  
Via alla Torre 2, 6850 Mendrisio ,Switzerland

RF Operating Frequency (ies) : 2402 - 2480MHz

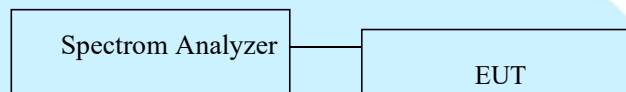
Date of Test : Mar.28-Apr.28 .2019

## 1.2. Test Facility

Site Description  
EMC Lab.

Name of Firm : Shenzhen STL Testing Technology Co., Ltd.  
Site Location : Unit C, 4F, Building A, ShengHengji Industrial Park, No. 13' FuYuan 1 Road, Heping Community, Fuyong Street, Baoan District, Shenzhen, China

## 1.3. Block Diagram of EUT Configuration



EUT Configuration

## 1.4. Support Equipment List

Table 2 Ancillary Equipment

Name	Model No	S/N	Manufacturer	Used
Laptop	E60A	/	LENOVO	YES

## 1.5. Operating Condition of EUT

The Bluetooth Module is activated and controlled by the System Simulator. During the test,  $V_{nor} = 3.3V$ ,  $V_{min} = 3.5V$ ,  $V_{max} = 4.2V$  DC Power are chosen and supplied by DC power supply. The sample work at hopping frequency transmitting mode.

## 1.6. Test Conditions

Temperature: -20~55°C  
Relative Humidity: 50~70 %

## 1.7. Modifications

No modification was made.

## 1.8. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

## 2. TEST RESULTS SUMMARY

Table 1 Test Results Summary

EN Reference		EN 300 328 V2.2.0	Result
Nº	Sub clause	Test Items	
1	4.3.1.2	RF Output Power	PASS
2	4.3.1.3	Duty cycle ,Tx-sequence, Tx-gap	N/A <sup>Note 1</sup>
3	4.3.1.4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	PASS
4	4.3.1.5	Hopping Frequency Separation	PASS
5	4.3.1.6	Medium Utilization (MU) factor	N/A <sup>Note 1</sup>
6	4.3.1.7	Adaptivity (Adaptive Frequency Hopping)	N/A <sup>Note 3</sup>
7	4.3.1.8	Occupied Channel Bandwidth	PASS
8	4.3.1.9	Transmitter unwanted emissions in the out-of-band domain	PASS
9	4.3.1.10	Transmitter unwanted emissions in the spurious domain	PASS
10	4.3.1.11	Receiver spurious emissions	PASS
11	4.3.1.12	Receiver Blocking	N/A <sup>Note 3</sup>
12	4.3.1.13	Geo-location capability	N/A <sup>Note 4</sup>
<p>Note 1: The EUT is an adaptive frequency hopping equipment and can't work in a non-adaptive mode.</p> <p>Note 2: The EUT is using FHSS modulation.</p> <p>Note 3: This requirement does not apply for equipment with a maximum RF Output power level of less than 10 dBm e.i.r.p.</p> <p>Note 4: This requirement only applies to equipment with geo-location capability.</p>			

Remark: "N/A" means "Not applicable."

### 3. TEST EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Horn Antenna	Sunol	DRH-118	A101415	2019.9.29
2	BicoNILog Antenna	Sunol	JB1 Antenna	A090215	2019.9.29
3	PREAMP	HP	8449B	3008A00160	2019.9.9
4	PREAMP	HP	8447D	2944A07999	2019.9.9
5	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2019.9.9
6	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2019.9.28
7	Signal Generator	Agilent	E4421B	MY4335105	2019.9.28
8	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2019.9.28
9	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2019.9.9
10	ANT Tower&Turn table Controller	Champro	EM 1000	60764	2019.9.28
11	Anechoic Chamber	Taihe Maorui	9m*6m*6m	966A0001	2019.9.9
12	Shielding Room	Taihe Maorui	6.4m*4m*3m	643A0001	2019.9.9
13	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2019.9.14
14	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2019.9.14
15	RF power divider	Anritsu	K241B	992289	2019.9.28
16	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2019.9.28
17	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2019.9.8
18	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2019.9.8
19	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2019.9.8
20	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2019.9.12
21	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2019.11.02
22	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2019.9.14
23	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2019.10.24

## 4. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test Item	Uncertainty
Occupied Channel Bandwidth	±1%
Uncertainty for radio frequency	1×10 <sup>-9</sup>
RF Output power, conducted	±0.6dB
Power Spectral Density, Conducted	±1.2dB
Unwanted Emissions, Conducted	±0.6dB
Temperature	±0.2°C
Humidity	±1%
DC and Low frequency voltage	±0.5%
Time	±1%
Duty Cycle	±1%
Uncertainty for Unwanted Emission, Radiated (30MHz-1GHz)	2.12 dB (Polarize: V)
	2.42 dB (Polarize: H)
Uncertainty for Unwanted Emission, Radiated (Above of 1GHz)	2.08dB(Polarize: V)
	2.16dB (Polarize: H)

## **5. EN 300 328 §4.3.1.2 - RF Output Power**

### **5.1. Test Requirements**

#### **5.1.1. Test Standard**

ETSI EN 300 328 V2.2.0 (2017-11)

#### **5.1.2. Test Limit**

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20 dBm.

### **5.2. Test Procedure**

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.2.2 for the measurement method.

### **5.3. Test Data**

### GFSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Effective radiated power (dBm)
$T_{nom}(20^{\circ}\text{C})$	$V_{nor}$	<b>2.4</b>
$T_{min}(-20^{\circ}\text{C})$	$V_{min}$	2.2
	$V_{max}$	2.1
	$V_{nom}$	2.3
	$V_{max}$	2.4
Measurement uncertainty		$\pm 1.5\text{dB}$

### $\pi/4$ -DQPSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Effective radiated power (dBm)
$T_{nom}(20^{\circ}\text{C})$	$V_{nor}$	2.0
$T_{min}(-20^{\circ}\text{C})$	$V_{min}$	1.9
	$V_{max}$	2.2
	$V_{nom}$	2.1
	$V_{max}$	2.0
Measurement uncertainty		$\pm 1.5\text{dB}$

### 8DPSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Effective radiated power (dBm)
$T_{nom}(20^{\circ}\text{C})$	$V_{nor}$	1.7
$T_{min}(-20^{\circ}\text{C})$	$V_{min}$	1.8
	$V_{max}$	1.7
	$V_{nom}$	1.6
	$V_{max}$	1.6
Measurement uncertainty		$\pm 1.5\text{dB}$

## 6. EN 300 328 §4.3.1.4 –Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

### 6.1. Test Requirements

#### 6.1.1. Test Standard

ETSI EN 300 328 V2.2.0 (2017-11)

#### 6.1.2. Test Limit

The Accumulated Transmit Time on any hopping frequency shall not be greater than 15 ms within any observation period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

Adaptive Frequency Hopping equipment shall be capable of operating over a minimum of 70 % of the band specified in clause 1.

The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

### 6.2. Test Procedure

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.4 for the measurement method.

### 6.3. Test Data

#### GFSK Mode

Accumulated Transmit Time				
Test Condition	Temperature:20°C , Voltage:3.3V			
Channel	Frequency(MHz)	Accumulated Dwell Time(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.21	19.05	<=400	6000.000
High Channel	2480.35	11.44	<=400	6000.000
Test Verdict		PASS		



Frequency Occupation				
Test Condition	Temperature:20°C , Voltage:3.3V			
Channel	Frequency(MHz)	Minimum Frequency Occupation(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.15	35.03	>0	4740.000
High Channel	2480.27	42.17	>0	4740.000
Test Verdict		PASS		

Hopping Sequence			
Test Condition	Temperature:20°C , Voltage:3.3V		
Number of Hopping Frequencies	Limit	Band Allocation (%)	Limit Band Allocation (%)
79	>=16	94	>=70
Test Verdict		PASS	

 **$\pi/4$ -DQPSK Mode**

Accumulated Transmit Time				
Test Condition	Temperature:20°C , Voltage:3.3V			
Channel	Frequency(MHz)	Accumulated Dwell Time(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.26	25.46	<=400	6000.000
High Channel	2480.15	41.82	<=400	6000.000
Test Verdict		PASS		

Frequency Occupation				
Test Condition	Temperature:20°C , Voltage:3.3V			
Channel	Frequency(MHz)	Minimum Frequency Occupation(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.12	27.45	>0	4740.000
High Channel	2480.14	28.03	>0	4740.000
Test Verdict		PASS		

Hopping Sequence			
Test Condition	Temperature:20°C , Voltage:3.3V		
Number of Hopping Frequencies	Limit	Band Allocation (%)	Limit Band Allocation (%)
79	>=16	95	>=70
Test Verdict		PASS	

**8-DPSK Mode**

Accumulated Transmit Time				
Test Condition	Temperature:20℃ , Voltage:3.3V			
Channel	Frequency(MHz)	Accumulated Dwell Time(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.32	31.82	≤400	6000.000
High Channel	2480.44	29.61	≤400	6000.000
Test Verdict		PASS		

Frequency Occupation				
Test Condition	Temperature:20℃ , Voltage:3.3V			
Channel	Frequency(MHz)	Minimum Frequency Occupation(ms)	Limit(ms)	Measurement Time(ms)
Low Channel	2402.24	18.46	>0	4740.000
High Channel	2480.33	22.27	>0	4740.000
Test Verdict		PASS		

Hopping Sequence			
Test Condition	Temperature:20℃ , Voltage:3.3V		
Number of Hopping Frequencies	Limit	Band Allocation (%)	Limit Band Allocation (%)
79	≥15	95	≥70
Test Verdict		PASS	

## **7. EN 300 328 §4.3.1.5 – Hopping Frequency Separation**

### **7.1. Test Requirements**

#### **7.1.1. Test Standard**

ETSI EN 300 328 V2.2.0 (2017-11)

#### **7.1.2. Test Limit**

For non-adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal or greater than the Occupied Channel Bandwidth (see clause 4.3.1.8), with a minimum separation of 100 kHz.

For equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-adaptive Frequency Hopping equipment operating in a mode where the RF Output power is less than 10 dBm e.i.r.p. only the minimum Hopping Frequency Separation of 100 kHz applies.

### **7.2. Test Procedure**

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.5 for the measurement method.

### **7.3. Test Data**

### GFSK Mode

Test Condition	Temperature:20℃ , Voltage:3.3V	
Hopping Frequency Separation(MHz)	Limit(MHz)	Center Frequency of Separation(MHz)
0.9998	$\geq 0.1$	2439.095628
Test Verdict		PASS

### $\pi/4$ -DQPSK Mode

Test Condition	Temperature:20℃ , Voltage:3.3V	
Hopping Frequency Separation(MHz)	Limit(MHz)	Center Frequency of Separation(MHz)
0.9998	$\geq 0.1$	2412.110255
Test Verdict		PASS

### 8-DPSK Mode

Test Condition	Temperature:20℃ , Voltage:3.3V	
Hopping Frequency Separation(MHz)	Limit(MHz)	Center Frequency of Separation(MHz)
0.9999	$\geq 0.1$	2424.223546
Test Verdict		PASS

## 8. EN 300 328 §4.3.1.8 - Occupied Channel Bandwidth

### 8.1. Test Requirements

#### 8.1.1. Test Standard

ETSI EN 300 328 V2.2.0 (2017-11)

#### 8.1.2. Test Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in clause 1.

For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the Nominal Channel Bandwidth declared by the supplier. See clause 5.3.1 j). This declared value shall not be greater than 5 MHz.

### 8.2. Test Procedure

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.8 for the measurement method.

### 8.3. Test Data

Test Condition	Temperature 20°C, Voltage 3.3V				
Mode	DUT Frequency (MHz)	Channel Center Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Lower Band Edge (MHz)	Upper Band Edge (MHz)
GFSK	2402.09	2402.06	0.63	2401.69	2402.61
	2480.08	2480.07	0.65	2479.58	2480.61
$\pi/4$ -DQPSK	2402.05	2402.06	0.58	2401.59	2402.59
	2480.07	2480.05	0.56	2479.55	2480.58
8-DPSK	2402.10	2402.04	0.57	2401.46	2402.56
	2480.09	2480.11	0.67	2479.62	2480.57
Test Verdict	PASS				

## 9. EN 300 328 §4.3.1.9 - Transmitter unwanted emissions in the out-of-band domain

### 9.1. Test Requirements

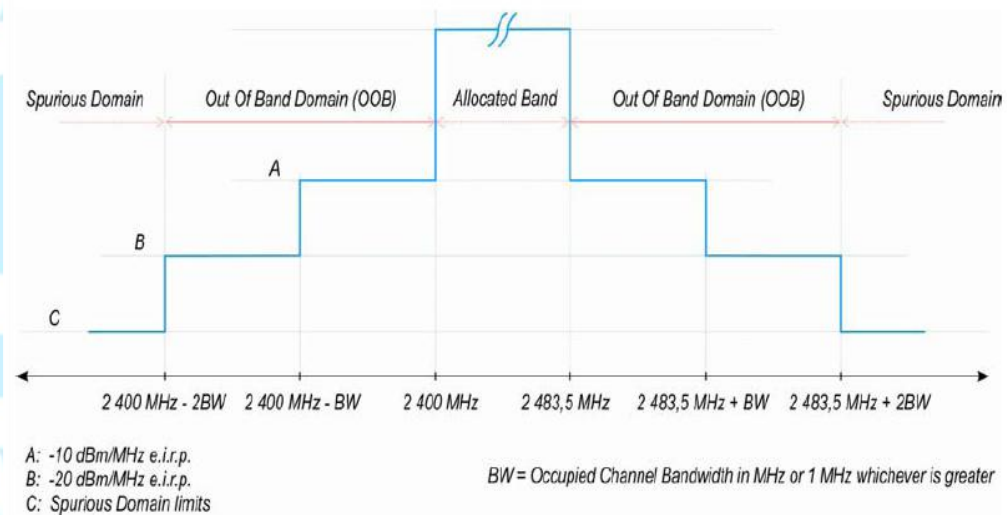
#### 9.1.1. Test Standard

ETSI EN 300 328 V2.2.0 (2017-11)

#### 9.1.2. Test Limit

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.8.



### 9.2. Test Procedure

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.9 for the measurement method.

### 9.3. Test Data

### GFSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Transmitter unwanted emissions in the out-of-band domain
$T_{nom}(20^{\circ}C)$	$V_{nor}$	PASS
$T_{min}(-20^{\circ}C)$	$V_{min}$	PASS
	$V_{max}$	PASS
	$V_{nom}$	PASS
	$V_{max}$	PASS

### $\pi/4$ -DQPSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Transmitter unwanted emissions in the out-of-band domain
$T_{nom}(20^{\circ}C)$	$V_{nor}$	PASS
$T_{min}(-20^{\circ}C)$	$V_{min}$	PASS
	$V_{max}$	PASS
	$V_{nom}$	PASS
	$V_{max}$	PASS

### 8-DPSK Mode

Ambient temperature: 21 °C		Relative humidity: 60%
Test conditions		Transmitter unwanted emissions in the out-of-band domain
$T_{nom}(20^{\circ}C)$	$V_{nor}$	PASS
$T_{min}(-20^{\circ}C)$	$V_{min}$	PASS
	$V_{max}$	PASS
	$V_{nom}$	PASS
	$V_{max}$	PASS

## 10. EN 300 328 §4.3.1.10 - Transmitter unwanted emissions in the spurious domain

### 10.1. Test Requirements

#### 10.1.1. Test Standard

ETSI EN 300 328 V2.2.0 (2017-11)

#### 10.1.2. Test Limit

Frequency range	Maximum power, e.r.p. ( $\leq 1$ GHz) e.i.r.p. ( $> 1$ GHz) (dBm)	Bandwidth
30MHz to 47MHz	-36	100kHz
47MHz to 74MHz	-54	100kHz
74MHz to 87.5MHz	-36	100kHz
87.5MHz to 118MHz	-54	100kHz
118MHz to 174MHz	-36	100kHz
174MHz to 230MHz	-54	100kHz
230MHz to 470MHz	-36	100kHz
470MHz to 862MHz	-54	100kHz
862MHz to 1GHz	-36	100kHz
1GHz to 12.75GHz	-30	1MHz

### 10.2. Test Procedure

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.10 for the measurement method.

### 10.3. Test Data

Ambient temperature: 21℃		Relative humidity: 60%	
Test mode	Transmitter unwanted emissions in the spurious domain		
GFSK	PASS		
$\pi/4$ -DQPSK	PASS		
8-DPSK	PASS		

## 11. EN 300 328 §4.3.1.11 – Receiver spurious emissions

### 11.1. Test Requirements

#### 11.1.1. Test Standard

ETSI EN 300 328 V2.2.0 (2017-11)

#### 11.1.2. Test Limit

Frequency range	Maximum power, e.r.p. ( $\leq 1$ GHz) e.i.r.p. ( $> 1$ GHz) (dBm)	Bandwidth
30MHz to 1GHz	-57	100KHz
1GHz to 12.75GHz	-47	1MHz

### 7.2. Test Procedure

Please refer to ETSI EN 300 328 V2.2.0 (2017-11) Sub-clause 5.3.11 for the measurement method.

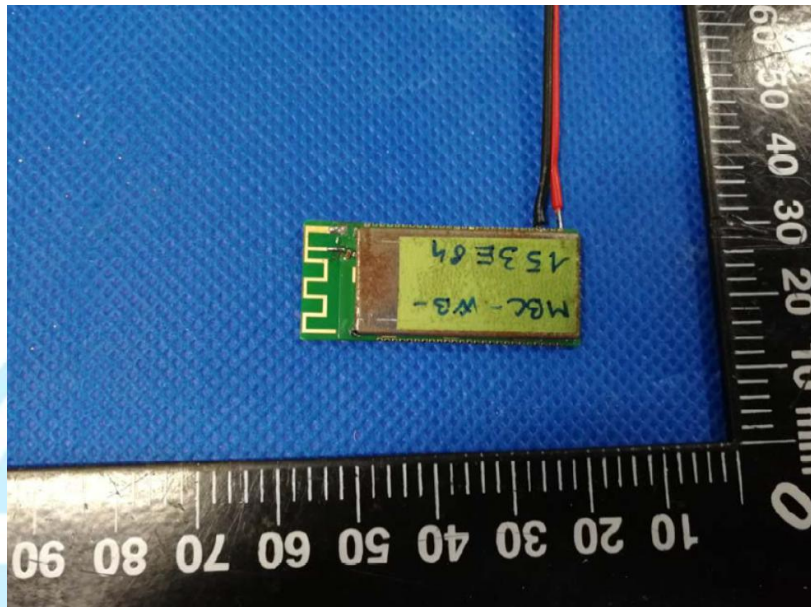
### 7.3. Test Data

Ambient temperature: 21 °C		Relative humidity: 60%	
Test mode		Receiver spurious emissions	
GFSK		PASS	
$\pi/4$ -DQPSK		PASS	
8-DPSK		PASS	

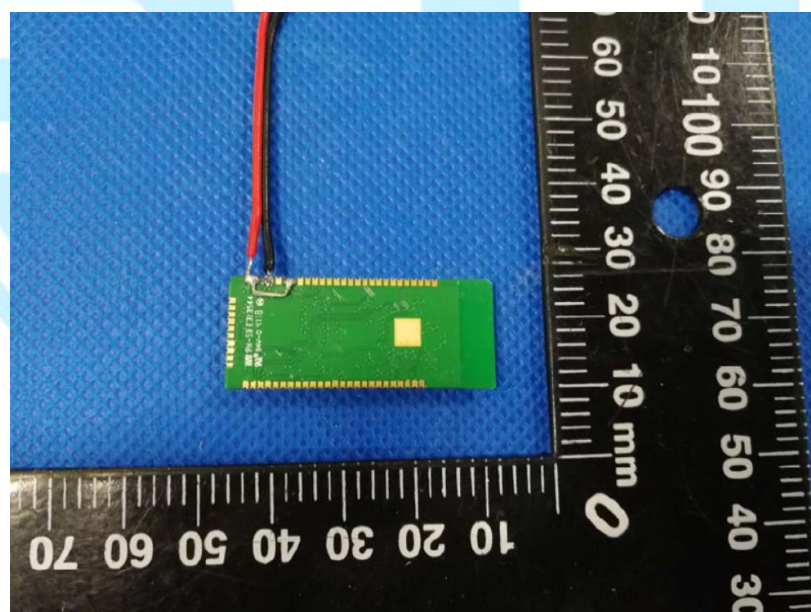


## APPENDIX I

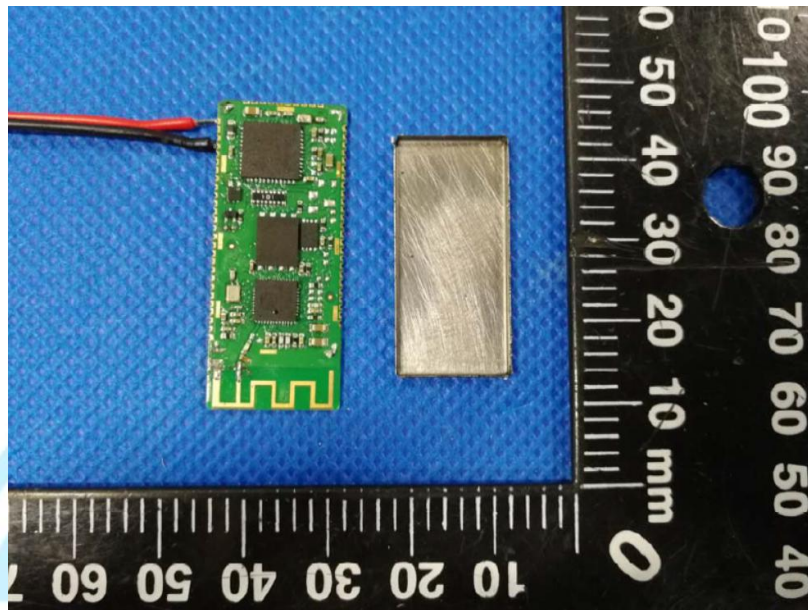
**Figure 1**



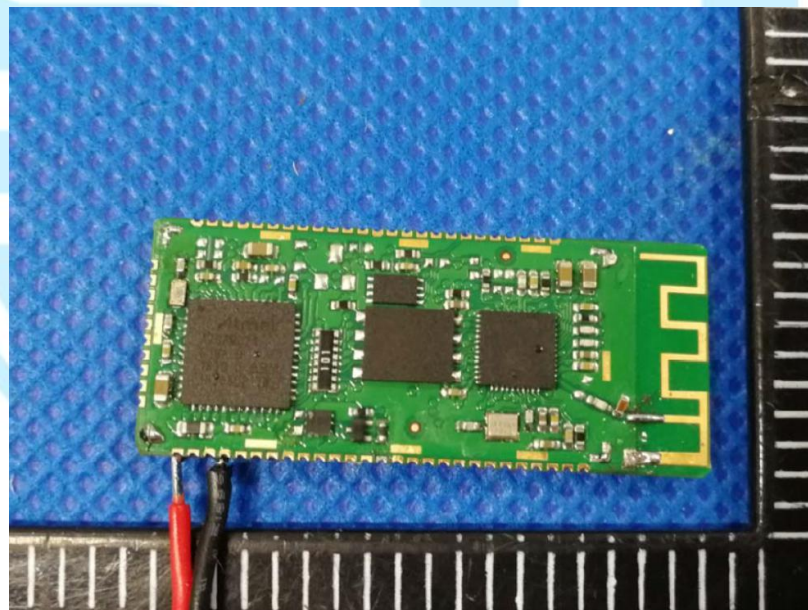
**Figure 2**



**Figure 3**



**Figure 4**



\*\*\*End of the Report\*\*\*