



Registration
No.788871

MPE REPORT

Report No.: SRTC2018-9004(F)-18072501(I)

Product Name: The bluetooth module

Product Model: i480e, i480e-MD2

Applicant: Barrot Technology Limited

Manufacturer: Barrot Technology Limited

Specification: FCC Part §2.1093, §1.1307(b)

FCC ID: 2AOXV-I480EI480EMD2

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District, Beijing,P.R.China

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1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
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1.3 Applicant's details

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Email:	marketing@barrot.com.cn

1.4 Manufacturer's details

Company:	Barrot Technology Limited
Address:	C710, Shangdi International Pioneering Park No.2, Shang Di Xin Xi Road, Haidian District, Beijing
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Kerlwin Qiu
Tel:	+86 10 82702580
Fax:	+86 10 62963059
Email:	marketing@barrot.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2018-07-25
Testing Start Date:	2018-07-25
Testing End Date:	2018-08-10

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30

Normal Supply Voltage (V d.c.):	3.7
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2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

BLE

Frequency Range	2.402GHz~2.480GHz
Number of Channel	40
Modulation Type	GFSK
Equipment Class	DTS
Transmission specification	5.0
Channel Spacing	2MHz
Data Rate	1Mbps
Power Supply	AC adapter
Rated Power Supply Voltage	3.7V
HW Version	BB
SW Version	I480E.STD3.0.20180328.1
Sample	Sample #1

BT

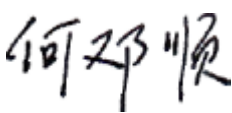
Frequency Range	2.402GHz~2.480GHz
Number of Channel	79
Modulation Type	GFSK, $\pi/4$ DQPSK, 8DPSK
Duplex Mode	TDD
Channel Spacing	1MHz
Data Rate	1Mbps, 2 Mbps, 3 Mbps
Power Supply	AC adapter
Rated Power Supply Voltage	3.7V
HW Version	BB
SW Version	I480E.STD3.0.20180328.1
Sample	Sample #1

3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1093	June 23, 2015	Radiofrequency radiation exposure evaluation: portable devices.
1.1307(b)	Apr. 22, 1986	Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.
KDB447498 D01	October 23, 2015	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

4 RESULT SUMMARY

No.	Test case	FCC reference
1	MPE Calculation	FCC Part §2.1093, FCC Part §1.1307(b) KDB447498 D01

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. He Dengshun 	Issued date:

5 TEST RESULTS

5.1 Average Power Output

5.1.1 Ambient condition

Temperature	Relative humidity	Pressure
25°C	30%	101.5kPa

5.1.2 Test Description

A transmitter antenna terminal of EUT is connected to the power meter. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle (>98%), at maximum power, and at the appropriate frequencies.

5.1.3 Test Procedure Used

KDB 558074 D01 DTS Meas Guidance v04 – Section 9.2.3

5.1.4 Test Settings

The maximum average conducted output power may be measured using a broadband average RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.

2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.

3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

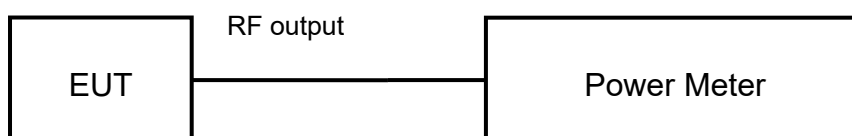
b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

c) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

d) Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

5.1.5 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



5.1.6 Test Result

BLE

Modulation type	Average Power Output (dBm)		
	2402MHz (Ch0)	2440MHz (Ch19)	2480MHz (Ch39)
GFSK (LE 1Mbps)	5.78	6.06	5.98
GFSK (LE 2Mbps)	5.87	6.35	6.27

BT

Modulation type	Average Power Output (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	3.54	3.61	2.62
$\pi/4$ DQPSK	-0.14	-0.09	-1.28
8DPSK	-0.08	-0.12	-1.27

5.2 Calculation result

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(A) Limits for Occupational/Controlled Exposure ☐

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

(B) Limits for General Population/Uncontrolled Exposure ☒

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = frequency in MHz *Plane-wave equivalent power density

Calculation procedure:

According to §2.1093 and §1.1307(b), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

The $S = PG / (4\pi R^2)$

Where S = power density in mW/cm²

P = transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent worst case in terms of the exposure levels.

Modulation type	Freq (GHz)	Power		Antenna Gain		R (cm)	S (mW/cm ²)	Limits (mW/cm ²)
		(dBm)	(mW)	(dBi)	(Numeric)			
GFSK (BER)	2.441	3.61	2.30	3.00	2.00	20	0.001	1.00
GFSK (LE)	2.440	6.35	4.32	3.00	2.00	20	0.002	1.00

Note: 1mW/cm² from 1.1310 Table 1.

According to the KDB447498 D01 section 7.1 determine the device is exclusion from SAR test.

---End of Test Report---