



REPORT No. : SZ17050133S02

RF EXPOSURE EVALUATION REPORT

APPLICANT : Pycom Ltd

PRODUCT NAME : Triple Network (LoRa, WiFi and Bluetooth) IoT development Module powered by MicroPython.

MODEL NAME : L01 1.0

TRADE NAME : LoPy OEM

BRAND NAME : Pycom

FCC ID : 2AJMTLOPY01R

STANDARD(S) : 47CFR 2.1091
KDB 447498 D01 General RF Exposure Guidance v06

ISSUE DATE : 2017-09-12



SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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Change History		
Issue	Date	Reason for change
1.0	2017-09-12	First edition

**TEST REPORT DECLARATION**

Applicant	Pycom Ltd
Applicant Address	Registered Office 57 Avenue Road Cranleigh, Surrey GU6 7LJ UK
Manufacturer	In-Tech Electronics Ltd
Manufacturer Address	2/F Rhythm Home, 119 Shazui Road,Futian,Shenzhen,Guangdong,P.R.China
Product Name	Triple Network (LoRa, WiFi and Bluetooth) IoT development Module powered by MicroPython.
Model Name	L01 1.0
Brand Name	Pycom
HW Version	1.0r
SW Version	1.0
Test Standards	47CFR 2.1091; KDB 447498 D01 General RF Exposure Guidance v06
Issue Date	2017-09-12
SAR Evaluation	Not Required

Tested by

:

Peng Fuwei (Test engineer)

Approved by

:

Peng Huarui (Supervisor)



1. TECHNICAL INFORMATION

Note: the following data is based on the information by the applicant.

1.1. Identification of Applicant

Company Name:	Pycom Ltd
Address:	Registered Office 57 Avenue Road Cranleigh, Surrey GU6 7LJ UK

1.2. Identification of Manufacturer

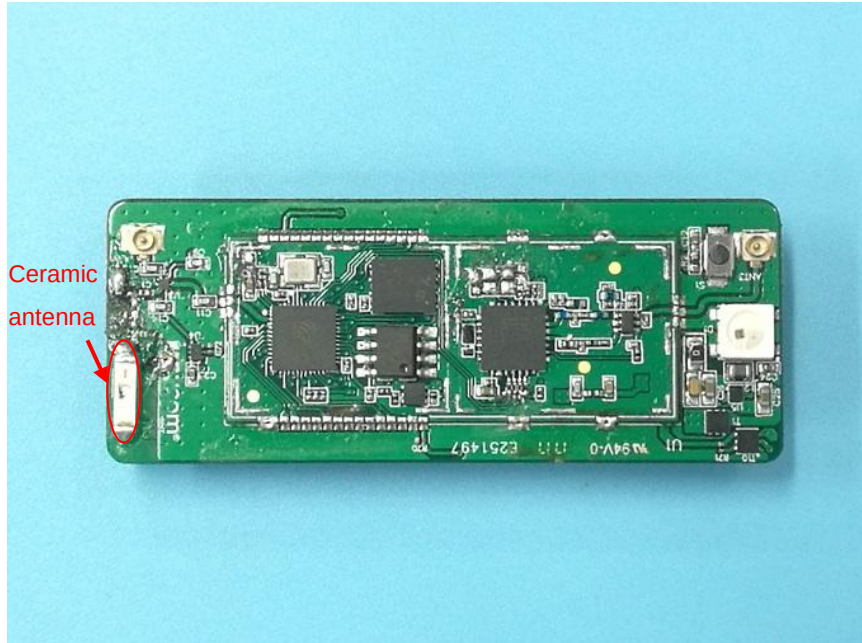
Company Name:	In-Tech Electronics Ltd
Address:	2/F Rhythm Home, 119 Shazui Road, Futian, Shenzhen, Guangdong, P.R. China

1.3. Equipment Under Test (EUT)

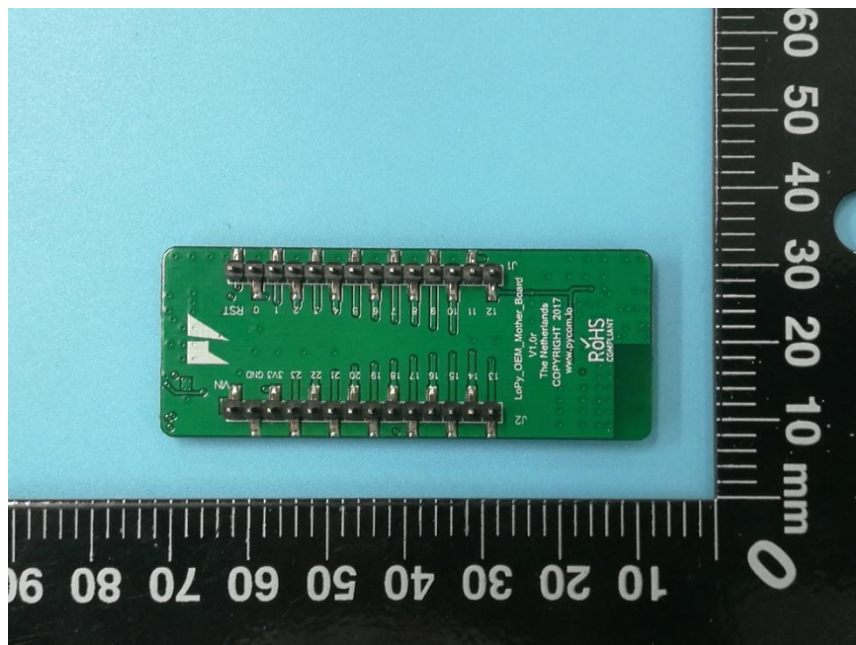
Model Name:	L01 1.0
Trade Name:	LoPy OEM
Brand Name:	Pycom
Hardware Version:	1.0r
Software Version:	1.0
Frequency Bands:	Bluetooth 4.0: 2402-2480MHz; Wifi 802.11b/g/n: 2412-2484MHz; LoRa: 902 to 928 MHz
Modulation Mode:	Bluetooth 4.0: GFSK; Wifi 802.11b: DSSS; Wifi 802.11g/n: OFDM;
Lora Antenna 1 type:	External Antenna (P/N "Molex: 1052620001")
Lora Antenna 1 Gain:	1.4dBi
Lora Antenna 2 type:	External Antenna
Lora Antenna 2 Gain:	0.5dBi
WiFi & BT Antenna 1 type:	Ceramic Antenna
WiFi & BT Antenna 1 Gain:	-0.5dBi
WiFi & BT Antenna 2 type:	External Antenna
WiFi & BT Antenna 2 Gain:	2.0dBi

1.3.1. Photographs of the EUT

1. EUT front view



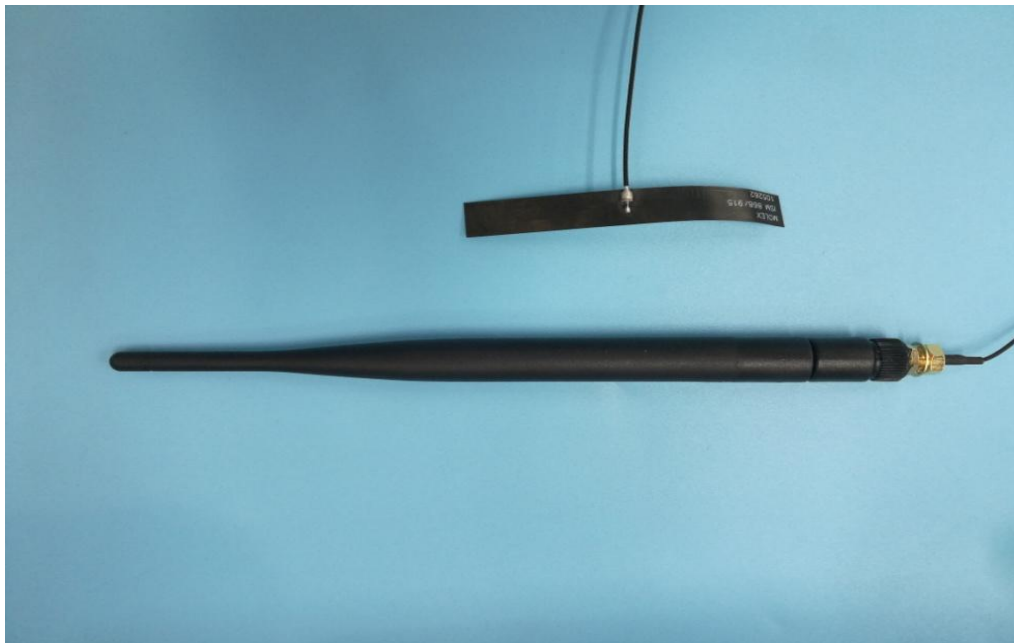
2. EUT rear view



3. EUT External antenna view



4. LoRa antenna view





1.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	1.0r	1.0

1.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	47 CFR§2.1091	Radiofrequency Radiation Exposure Evaluation: mobile devices
2	KDB 447498 D01v06	General RF Exposure Guidance



2. DEVICE CATEGORY AND RF EXPOSURE LIMIT

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
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

3. MEASUREMENT OF CONDUCTED PEAK OUTPUT POWER

1. Bluetooth Average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			GFSK	$\pi/4$ -DQPSK	8-DPSK
BT2.1	0	2402	-2.02	-0.53	-0.25
	19	2440	-1.73	-0.08	0.19
	39	2480	-2.15	-0.34	-0.03

Band	Channel	Frequency (MHz)	Output Power(dBm)
			GFSK
BT4.0	0	2402	-0.95
	19	2440	0.54
	39	2480	2.09

2. Wifi 2.4G Conducted Average Output Power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			802.11B	802.11G	802.11N 20
Wifi	1	2412	12.68	8.88	8.98
	6	2437	11.82	8.51	8.62
	11	2462	10.93	7.93	8.01

Band	Channel	Frequency (MHz)	Output Power(dBm)
			802.11n40
Wifi	3	2422	8.93
	6	2437	8.41
	9	2452	7.91



3. LoRa Conducted Peak Output Power

Band	Channel	Frequency (MHz)	Output Power (dBm)
LoRa	64	903.0	19.43
	68	909.4	19.37
	71	914.2	19.28



4 RF EXPOSURE EVALUATION

Standalone transmission MPE evaluation

Antenna 1:

Bands	Frequency (MHz)	Antenna Gain (dBi)	Conducted Average Power (dBm)	Time-averaging EIRP (mW)	Power density (mW/cm ²)	Limit for MPE (mW/cm ²)
BT	2480	-0.5	2.09	0.04	0.00001	2.736
2.4GHz	2412	-0.5	12.68	16.52	0.00329	2.684
Lora	903	1.4	19.43	121.06	0.02410	0.602

Antenna 2:

Bands	Frequency (MHz)	Antenna Gain (dBi)	Conducted Average Power (dBm)	Time-averaging EIRP (mW)	Power density (mW/cm ²)	Limit for MPE (mW/cm ²)
BT	2480	2.0	2.09	0.58	0.00012	2.736
2.4GHz	2412	2.0	12.68	29.38	0.00585	2.684
Lora	903	0.5	19.43	98.40	0.01959	0.602



ANNEX C GENERAL INFORMATION

1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

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