Datasheet

EMW5080

Embedded Wi-Fi module

Version：1.3　　　　**Date：2018-11-28**　　　　**Number: DS0082EN**

Abstract

Features

- Support 802.11b/g/n, integrate 133MHz ARM-CM4F, WLAN MAC/Baseband/RF

- 256KB RAM/ 2MB FLASH

- Working Voltage: DC 5.0V

- Maximum transmission rate up to 72.2 Mbps with 20 MHz bandwidth.

- Maximum transmission rate up to 150 Mbps with 40 MHz bandwidth.

- Wi-Fi Features
  - Support 802.11b/g/n，HT-40
  - Support Station, Soft AP, Station+Soft AP
  - Support EasyLink，Alink，Joinlink

- Peripherals：
  - 1x HS UART

- Operating Temperature：
  - PCBA: -20℃ to +85℃
  - Plastic box: depends on detailed box model

- Antenna: PCB or IPX (Optional)

Application

- Intelligent lighting

- Intelligent Transportation

- Smart Home Application

- industrial automation

- Intelligent Security

Module Type

Part number	Antenna type	PCBA size (mm)
EMW5080-P	PCB antenna	21.6*35.6
EMW5080-E	IPEX connector	

Hardware Block
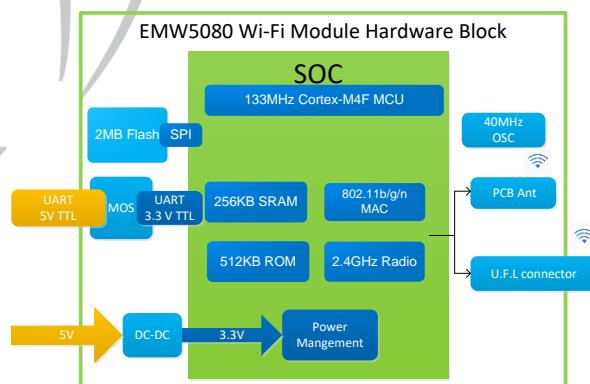
EMW5080

Copyright Notice

Version History

Date	Vision	Details
2018-11-28	1.3	First English version

Content

Abstract 1

Version History 1

1. **Product Introduction** 4

    1.1   LABEL INFORMATION 5

    1.2   DIMENSION 5

    1.3   PIN DEFINITION 6

2. **Electrical Parameters** 7

    2.1   OPERATING CONDITIONS 7

    2.2   POWER CONSUMPTION 7

    2.3   WORKING ENVIRONMENT 8

    2.4   ELECTROSTATIC DISCHARGE 8

3. **RF parameters** 9

    3.1   BASIC RF PARAMETERS 9

    3.2   TX PERFORMANCE 9

        3.2.1   Transmit performance of IEEE802.11b mode 9

        3.2.2   Transmit performance of IEEE802.11g mode 10

        3.2.3   Transmit performance of IEEE802.11n-HT20 mode 11

4. **Antenna Information** 13

    4.1   ANTENNA TYPE 13

    4.2   PCB ANTENNA CLEARANCE ZONE 13

    4.3   EXTERNAL ANTENNA CONNECTOR 15

5. **Assembly Information and Production Guidance** 16

    5.1   ASSEMBLY SIZE 16

    5.2   4-PIN CONNECTOR SIZE 17

    5.3   STORAGE CONDITION 18

6. **Part numbers** 19

    6.1   GLUE SPRAY BOX SIZE (BOX + COVER) 20

    6.2   GLUE POURING BOX SIZE 22

    6.3   GLUE POURING CABLE 23

7. **Reference Circuit** 24

8. **Other pins** 25

9. **Module MOQ and Package Information** 26

10. **Sales Information and Technical Support** 27

Figure Content

## Table Content

1. Product Introduction

EMW5080 is a cost-effective embedded Wi-Fi module released by MXCHIP with high integrating ARM CM4F, WLAN MAC/Baseband/RF. Maximum frequency 133MHz with 256KB SRAM and 2MB FLASH. Power supply is DC 5.0V. Peripherals: 1x Uart with connector.

Hardware diagram is shown below with four main parts:

- CM4F main core

- WLAN MAC/BB/RF/ANT

- UART

- Power management

With:

1. ARM CM4F CPU with 133MHz maximum frequency and 256KB SRAM and 2M FLASH.

2. 2MB SPI Flash is used for custom firmware development

3. Support PCB antenna and IPEX

4. Input voltage: DC 4.5-5.5V

EMW5080 Hardware block

1.1 Label Information

EMW5080-P Label   EMW5080-E Label
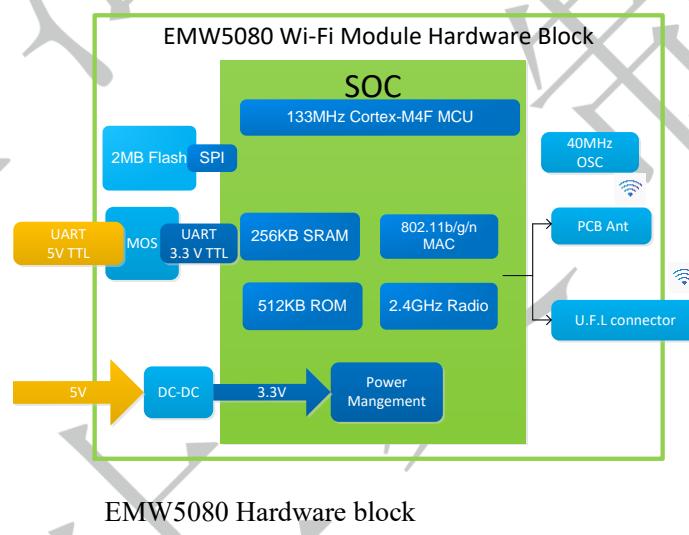
Figure 1 EMW5080 Label Information

Label Information：

CMIIT ID: SRRC approval number

EMW5080: Module part number

D0BAE420091F：MAC address (Each module has a unique MAC address)

0000.0000.0000 : SN series number

X1716：Date code

F5080P /F5080E: PCB antenna / IPEX connector

1.2 Dimension

EMW5080 uses a 4-pin connector for power supply and data transfer.
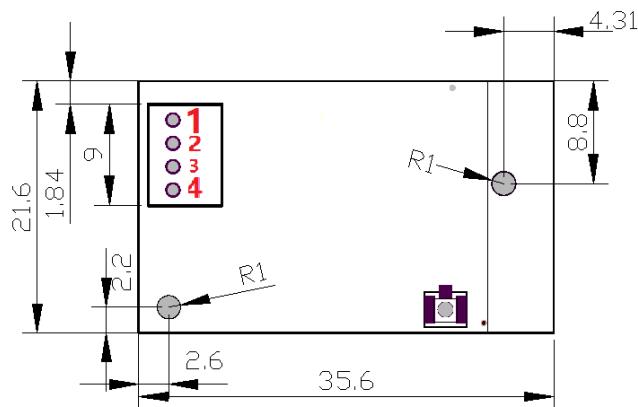
Figure 2   EMW5080 pins and size

MXCHIP®

1.3 Pin Definition

Table 1 EMW5080 Pin Definition

Pin NO.	Name	Function
1	VCC	Power supply
2	GND	Ground
3	RXD	UART Data Receive
4	TXD	UART Data Transmit

2. Electrical Parameters

2.1 Operating Conditions

EMW5080 would be unstable when input voltage is less than the lowest rated voltage.

Table 2 Range of input voltage

Symbol	Illustration	Condition	Details			
			Minimum	Typ	Maximum	Unit
VDD	Power Supply		4.5	5	5.5	V

Table 3 Current

Symbol	Note	最大值	单位
I_{VCC}	Current @VCC 5.0V	230	mA

There would be permanent damage in hardware if the device operates at the voltage over rated value. Meanwhile, reliability could be influenced when the device has a long-term operating at maximum voltage.

Table 3 Absolute maximum voltage rating

Symbol	Description	Minimum	Typ	Unit
VDD	Module input voltage	−0.3	5.5	V
VIN	GPIO input voltage	−0.3	5.5	V

2.2 Power Consumption

Table 4 EMW5080 Power Consumption

Mode	Current（5V）	Status
Monitor	96mA	WIFI config mode. Monitor SSID information, and connect to the router.
Idle	82mA	Keep connected to router. No data transfer.
Normal	207mA	Data transfer and receive at certain rate

Actual working current is variable at different operating mode. Maximum operating current 300 mA 。

2.3 Working Environment

Table 5 Temperature and humidity condition

Symbol	Name	Maximum	Unit
TSTG	PCBA Storage Temperature	-40 to +125	℃
TA	PCBA Operation Temperature	-20 to +85	℃
Humidity	Non-condensing, Relative humidity	95	%

2.4 Electrostatic Discharge

Table 6 Electrostatic Discharge Parameters

Symbol	Name	Details	Level	Maximum	Unit
V_{ESD}(HBM)	Electrostatic discharge voltage (Human Body Model)	TA= +25 °C , JESD22-A114	2	2000	V
V_{ESD}(CDM)	Electrostatic discharge voltage (Charged Device Model)	TA = +25 °C , JESD22-C101	II	500	

3. RF parameters

3.1 Basic RF parameters

Table 7 Radio-frequency standards

Name		Illustration
Working frequency		2.412~2.484GHz
Wi-Fi wireless standard		IEEE802.11b/g/n
Data transmission rate	20MHz	11b：1,2,5.5 和 11Mbps 11g : 6,9,12,18,24,36,48,54Mbps 11n : MCS0~7,72.2Mbps
	40MHz	11n：MCS0~7,150Mbps
Antenna type		PCB (Default) IPX (Optional)

3.2 TX Performance

3.2.1 Transmit performance of IEEE802.11b mode

Table 8 CCK_11 transmit performance parameters of IEEE802.11b mode

Category	Content				
Mode	IEEE802.11b				
Channel	CH1 to CH13				
Rate	1, 2, 5.5, 11Mbps				
TX	Minimum	Typ.	Maximum	Unit	
1. Output power	14	16.5	18.5	dBm	
2. Spectrum template					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Frequency offset	-15	-2	+15	ppm	

4. EVM(Peak EVM)					
1) 1~11Mbps	-	-	35%		
RX Minimum receiving sensitivity	Minimum	Typ	Maximum	Unit	
1Mbps (FER≦8%)	-	-98	-83	dBm	
11Mbps (FER≦8%)	-	-89	-76	dBm	

3.2.2　Transmit performance of IEEE802.11g mode

Table 9 OFDM_54 transmit performance parameters of IEEE802.11g mode

Category	Content				
Mode	IEEE802.11g				
Channel	CH1 to CH13				
Rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX	Minimum	Typ	Maximum	Unit	
1. Output Power	12.5	14.5	16.5	dBm	
2. Spectrum template					
1) at fc +/- 11MHz	-	-	-20	dBr	
2) at fc +/- 20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz			-40	dBr	
3. Frequency offset	-15	-2	+15	ppm	
4. EVM(Peak EVM)					
6Mbps	-	-30	-5	dBm	
54Mbps	-	-31	-25	dBm	
RX Minimum receiving sensitivity	Minimum	Typ	Maximum	Unit	
6Mbps (FER≦10%)	-	-92	-82	dBm	

| 54Mbps (FER≦10%) | - | -76 | -65 | dBm | |

3.2.3 Transmit performance of IEEE802.11n-HT20 mode

Table 10 MCS7 transmit performance parameters of IEEE802.11n-HT20 mode

Category	Content				
Mode	IEEE802.11n HT20				
Channel	CH1 to CH13				
Rate	MCS0/1/2/3/4/5/6/7, Maximum 72.2Mbps				
TX	Minimum	Typ	Maximum	Unit	
1. Output power	11.5	13.5	15.5	dBm	
2. Spectrum template					
1) at fc +/- 11MHz	-	-	-20	dBr	
2) at fc +/- 20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz			-45	dBr	
3. Frequency offset	-15	-2	+15	ppm	
4. EVM(Peak EVM)					
MCS0	-	-30	-5	dBm	
MCS7	-	-32	-27	dBm	
RX Minimum receiving sensitivity	Minimum	Typ	Maximum	Unit	
MCS0 (FER≦10%)	-	-92	-82	dBm	
MCS7 (FER≦10%)	-	-73	-64	dBm	

Table 11 MCS7 Transmit Performance of IEEE802.11n-HT 40MHz mode

Category	Content

Mode	IEEE802.11n HT40				
Channel	CH3 to CH11				
Rate	MCS0/1/2/3/4/5/6/7, Maximum 150Mbps				
TX	Minimum	Typ	Maximum	Unit	
1. Output power	11.5	13.5	15.5	dBm	
2. Spectrum template					
1) at fc +/- 22MHz	-	-	-20	dBr	
2) at fc +/- 40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz			-45	dBr	
3. Frequency offset	-15	-2	+15	ppm	
4. EVM(Peak EVM)					
MCS0	-	-30	-5	dBm	
MCS7	-	-32	-27	dBm	
RX Minimum receiving sensitivity	Minimum	Typ	Maximum	Unit	
MCS0 (FER≦10%)	-	-89	-79	dBm	
MCS7 (FER≦10%)	-	-69	-61	dBm	

4. Antenna Information

4.1 Antenna Type

EMW5080 has two type of antenna: PCB antenna for EMW5080-P, and IPEX connector for EMW5080-E

EMW5080-P

EMW5080-E

4.2 PCB Antenna Clearance Zone

Main PCB should have a distance over 16mm with other metal elements when using PCB antenna in Wi-Fi device. Shadow parts in the figure below should keep away from metal elements, sensor, interference source and other material that could cause signal interference.
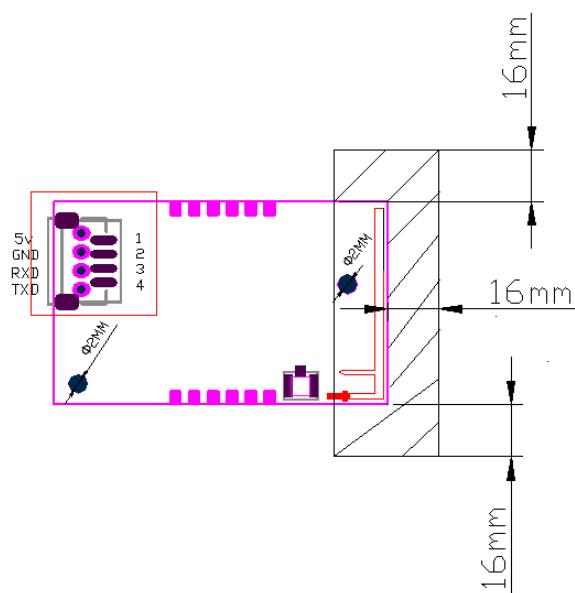
Figure 3 Minimum Clearance Zone of PCB Antenna (Unit: mm)

4.3 External Antenna Connector
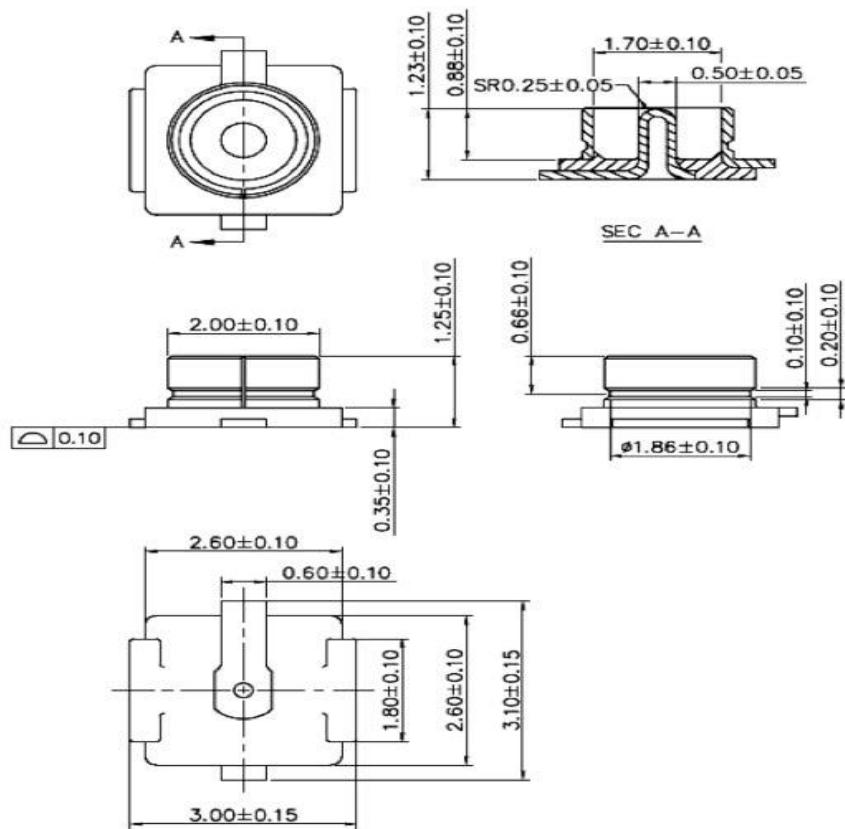
Figure 4 Size of External Antenna Connector

5. Assembly Information and Production Guidance

5.1 Assembly Size
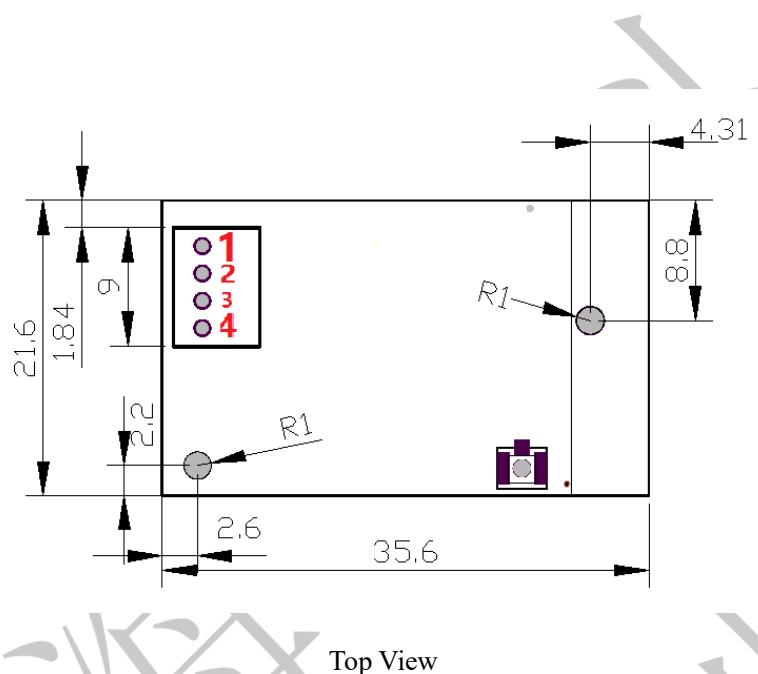
Top View

Note: EMW5080 has two locating holes. The hole in the lower left corner can use M2*3 size metal screw. The hole near PCB antenna is suggested to use plastic screw to avoid affecting antenna performance.

左视图

Left Side View
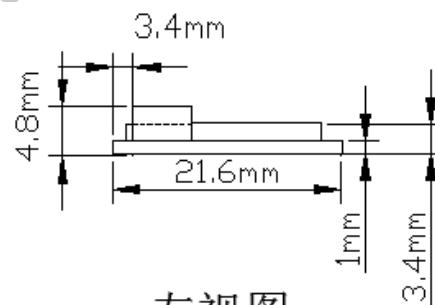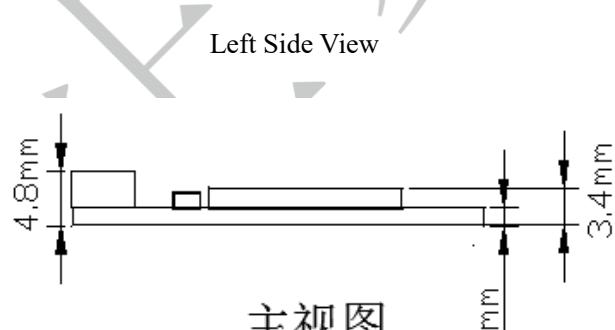
主视图

Side View

Figure 5 EMW5080 Side View (Unit: mm)

5.2 4-Pin connector size

1.50 .059

5.0 .200

2.55 .100

SEC. A-A SCALE 7/1   1.30 .051

B±0.30

A±0.15

1.50 .059 TYP. A

ø0.50 .020 TYP.

2.80 .110

1st Circuit

C +0.2 -0.1

DIM. A=1.50XNO. OF SPACES
DIM. B=DIM. A+4.5
DIM. C=DIM. A+2.1

3.75 .148 0~0.10

D 0.10

1.90±0.1 .075±.004

PCB EDGE

1st Circuit

4.3±0.10 .169±.004

7.0 Ref. .276 Ref.

1.4±0.05 .055±.002

1.1±0.1 .043±.004

1.4±0.05 .055±.002

1.50±0.05 .059±.002 TYP.

0.70±0.10. .028±.004 TYP.

A±0.10
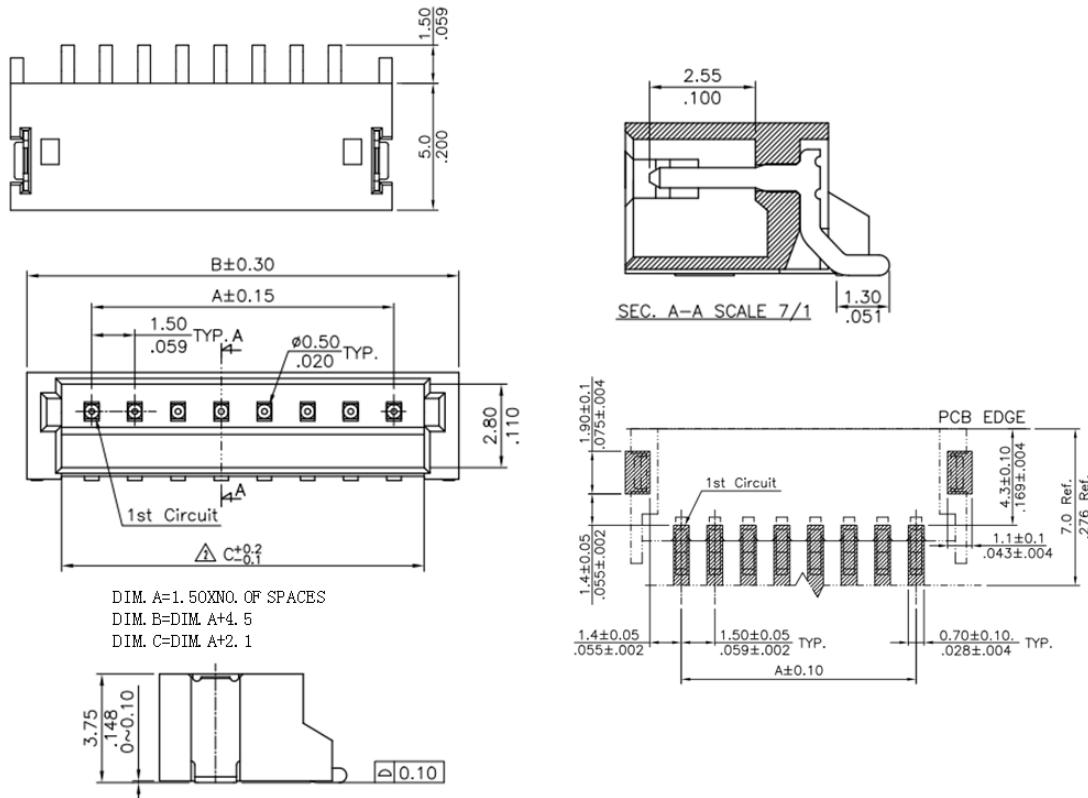
5.3 Storage Condition

Figure 6 Storage Condition

6. Part numbers

For PCBA, the part numbers are as below:

Part number	Antenna Type
EMW5080-P	PCB 天线
EMW5080-E	IPX 天线

For PCBA+BOX mode, the part numbers are as below:

Table 17. Recommended part numbers

Part number	Mode	Description
EMW5080-P	PCBA mode	Only PCBA
EMW5080-P-BOX1	Box and glue spray	PCBA+glue spray+box+assembly
EMW5080-P-BOX2	Box and glue pouring	PCBA+glue pourting+box+cable+assembly
EMW5080-E	PCBA	Only PCBA
EMW5080-E-BOX1	Box and glue spray	PCBA+glue spray+box+screws+ without assembly

Table 18. Other option part numbers

| Options			
	Glue spray	Box (including screws)	Assembly
EMW5080-P	0/1	0/1	0/1
EMW5080-E	0/1	0/1	0/1
Note: 1 for choose, 0 for not choose. For example, EMW5080-P-110: PCBA+Glue spray+box+without assembly；EMW5080-P-010：PCBA+box+ without assembly			

## 6.1 Glue spray box size (box + cover)
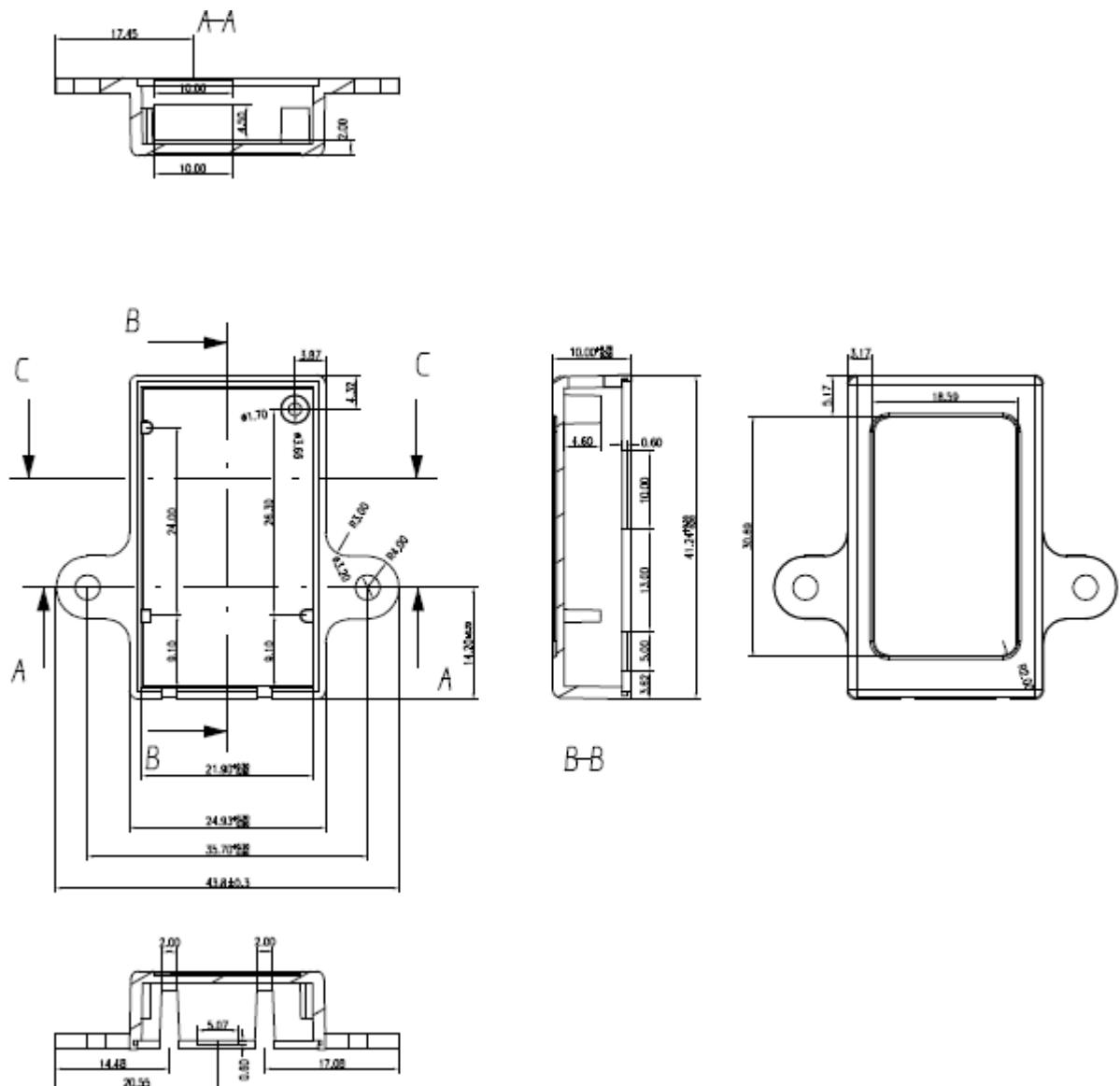
Figure 10. Glue spray box size
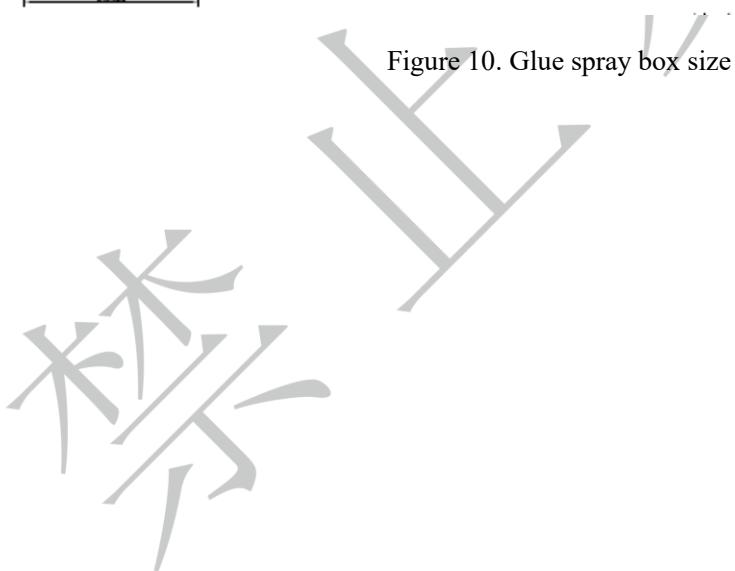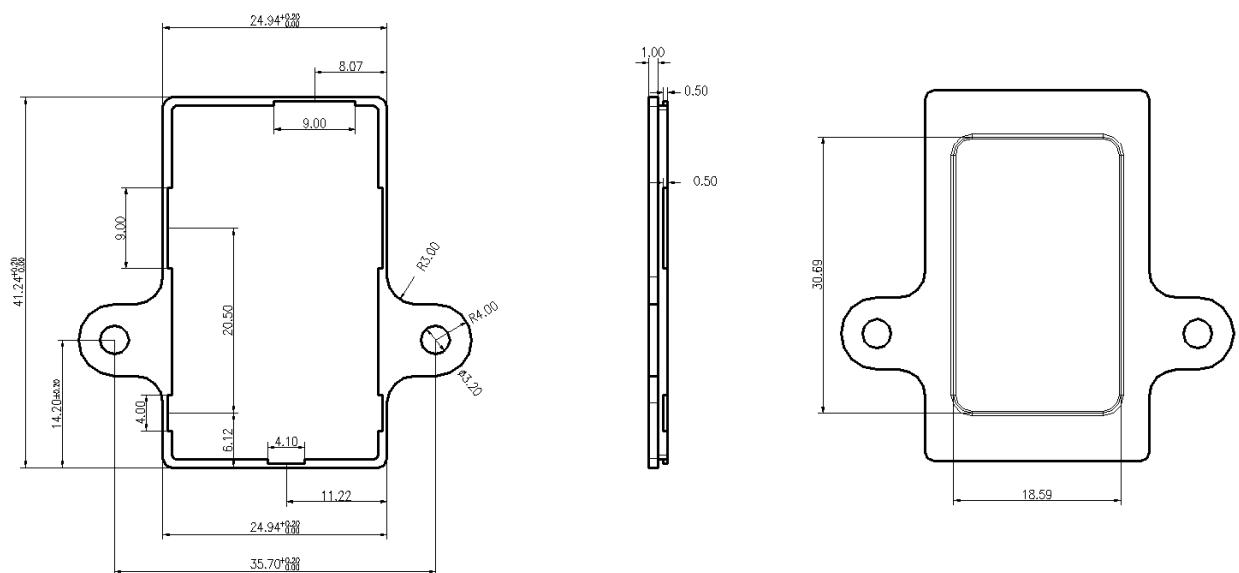
Figure 11. Glue spray box cover size

6.2 Glue pouring box size

6.3 Glue pouring cable

140±5

剥外皮25　　　　　　　　　　　　　　　　　　　　剥外皮20

(130±5)

20±3

热缩管 φ4mm*15mm

TX 白
RX 绿
GND 黑
+5V 红

白 TX
绿 RX
黑 GND
红 +5V

5 塑体 SANW-4Y 白色
6 端子 SANW

4 线体 UL2464
28AWG-4C黑色护体线
+铝箔屏蔽

1 塑体 316088-1 白色
2 端子 917765-1
3 锁定片917700-1
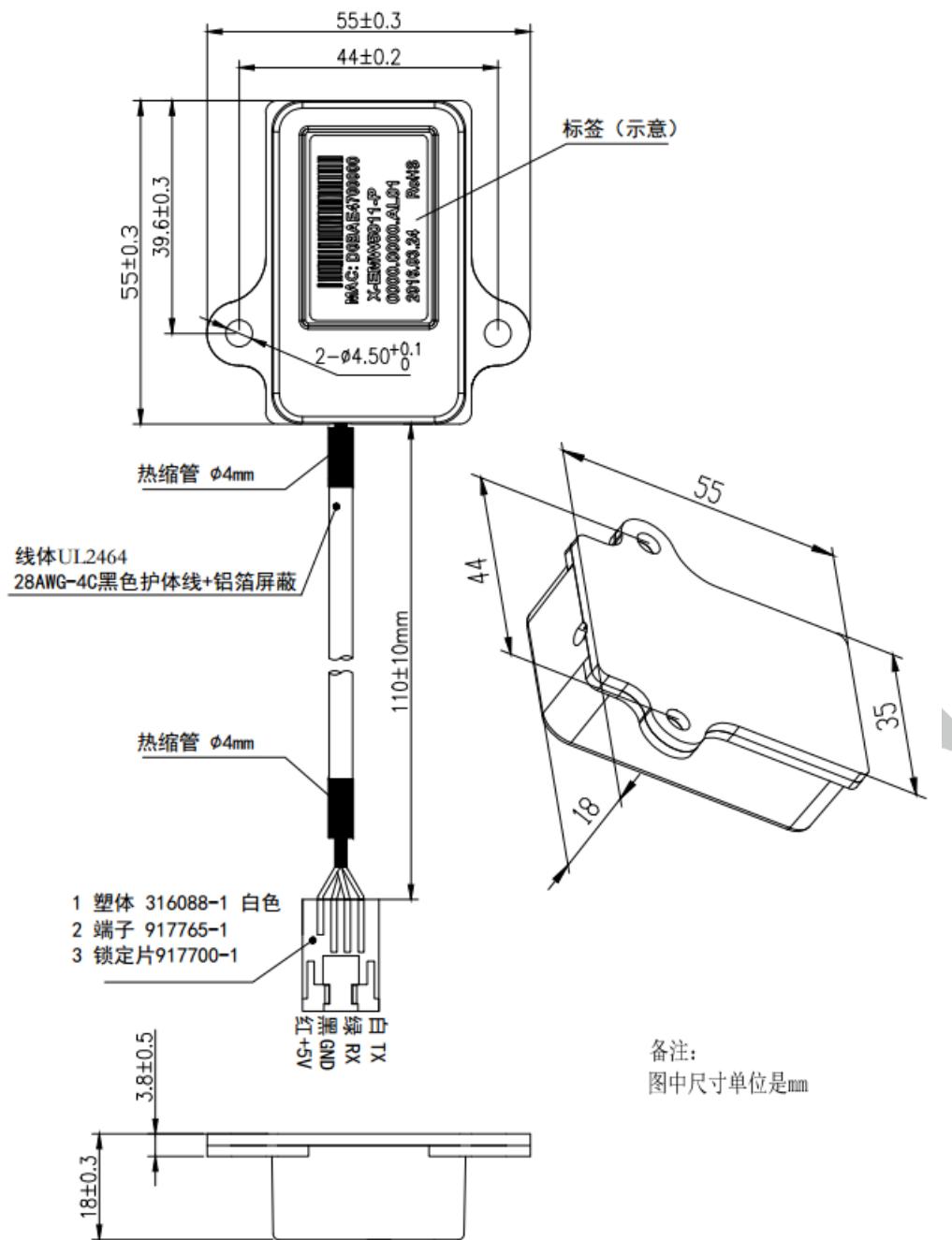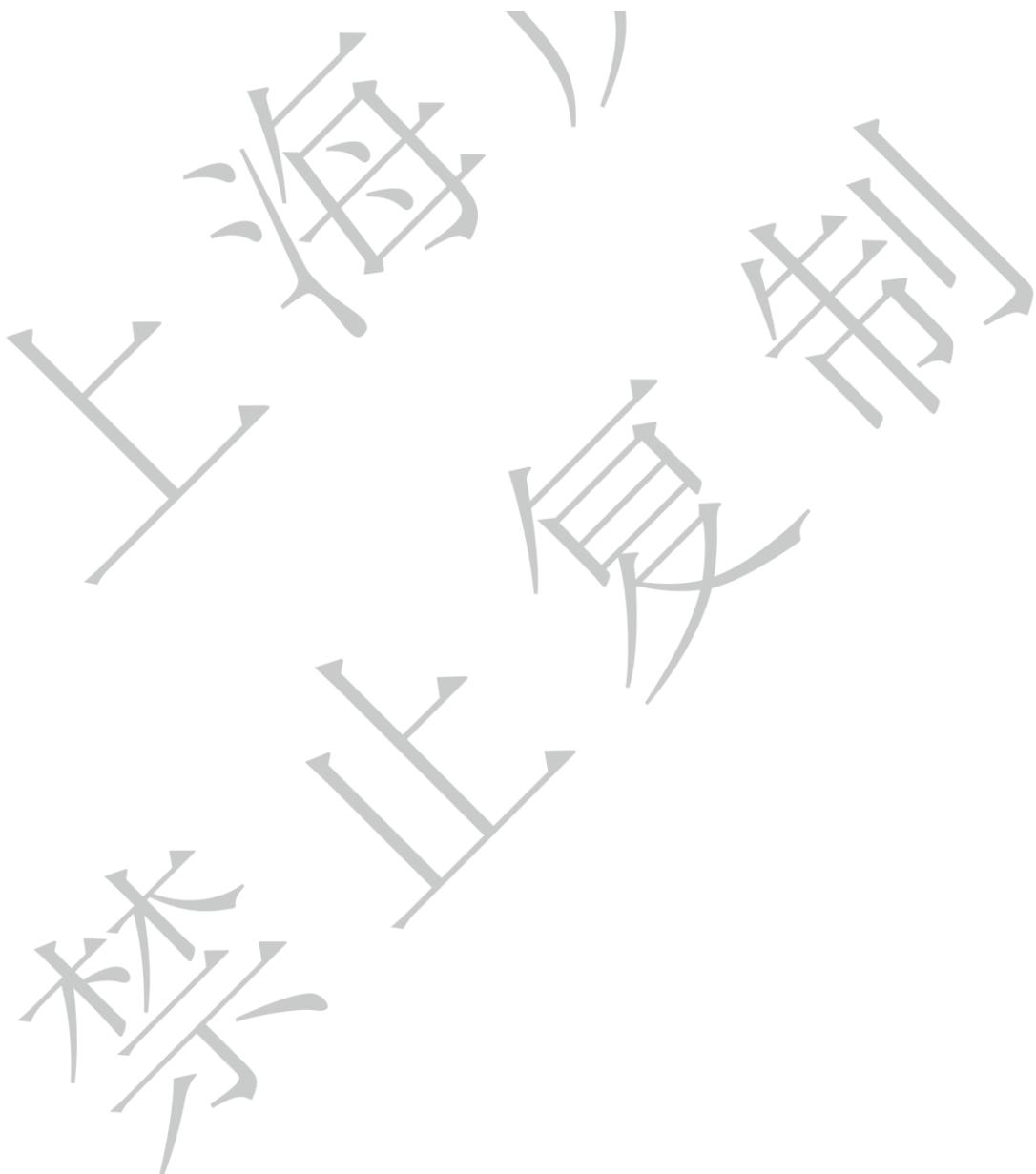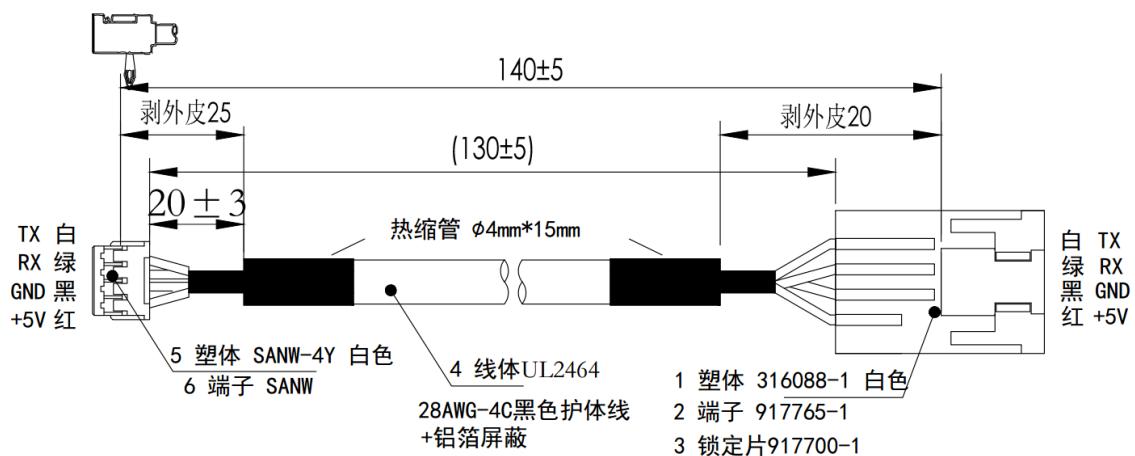
7. Reference Circuit

Inside 4-PIN connector, there are a high efficient 3.3V DC-DC, and a UART voltage converter circuit, so that the input of 4-PIN connector can be 5V voltage and UART.
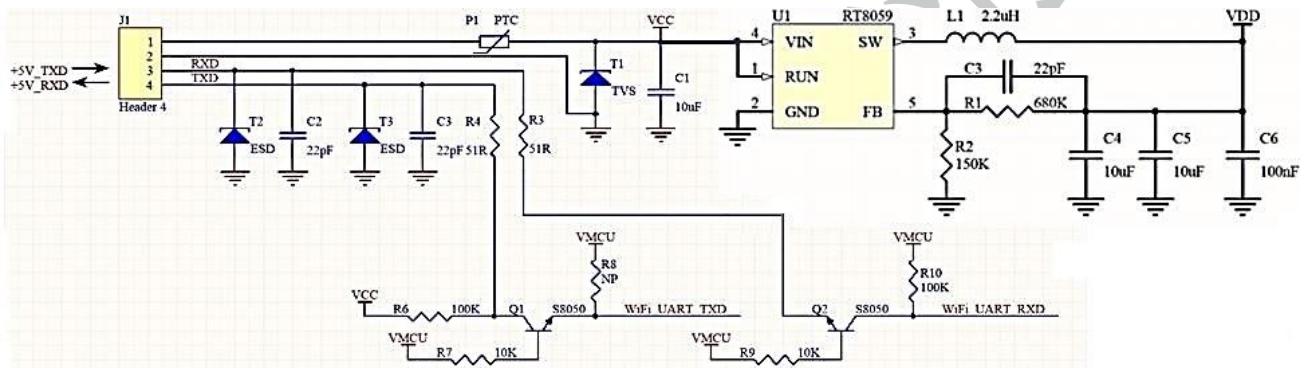
Figure 7 4-Pin connector internal circuit

8. Other pins

There are two lines of other pints for EMW5080. These pins are only used for development and debugging, not for product usage.
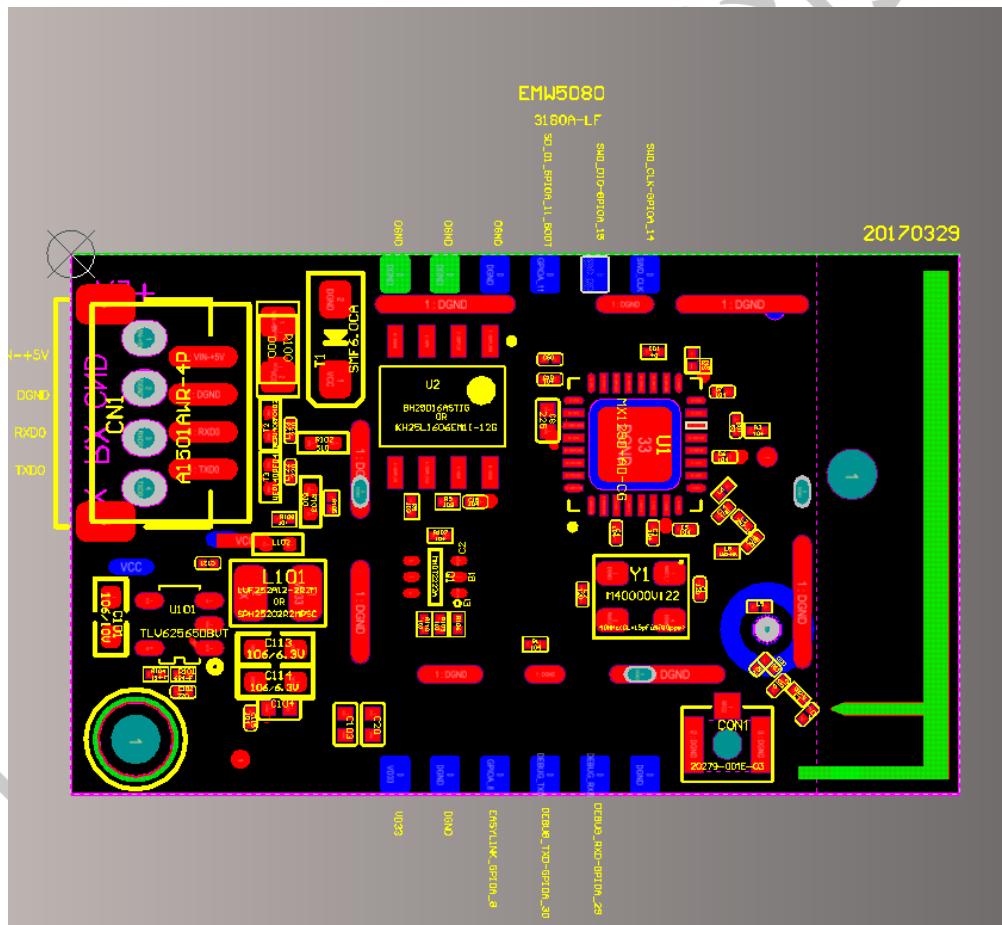
9. Module MOQ and Package Information

Table 16   Module MOQ and Package Information

	MOQ(pcs)	Packaging
EMW5080（PCBA）	1200	Tray
EMW5080（Glue spray box）	1080	Plastic bag
EMW5080（Glue pouring box）	1080	Plastic bag

10. Sales Information and Technical Support

For consultation or purchase the product, please contact Mxchip during working hours:

From Monday to Friday, morning 9:00~12:00, afternoon 13:00~18:00

Telephone: +86-21-52655026

Contact address: 9thFloor, No.5, Lane2145 JinshaJiang Road Putuo District, ShangHai.

Postcode：200333

Email: sales@mxchip.com