

Datasheet

EMW3290

Dual-antenna embedded Wi-Fi module

Version: 1.2

Date: 2018-1-24

No.: DS0115CN

Abstract

Features

- Support 802.11b/g/n standard and BLE4.2, set ARM9, WLAN MAC/Baseband/RF in one
- WiFi and BLE each have a separate antenna, which is more suitable for simultaneous data transmission between WiFi and BLE
- 256KB RAM/ 2MB FLASH configuration
- Operation voltage: DC 3.0-3.6V
- Using 20MHz bandwidth, the maximum transmission rate reaches 72.2Mbps
- Using 40MHz bandwidth, the maximum transmission rate reaches 150Mbps
- Wi-Fi & BLE related characteristics
 - Support 802.11b/g/n standard, HT-40
 - Support Station, Soft AP, support EasyLink, Alink
 - Support BLE master and slave modes
 - Dual onboard antenna or IPEX connector optional
- Peripherals:
 - UART
 - I2C
 - ADC
 - JTAG
 - GPIOs

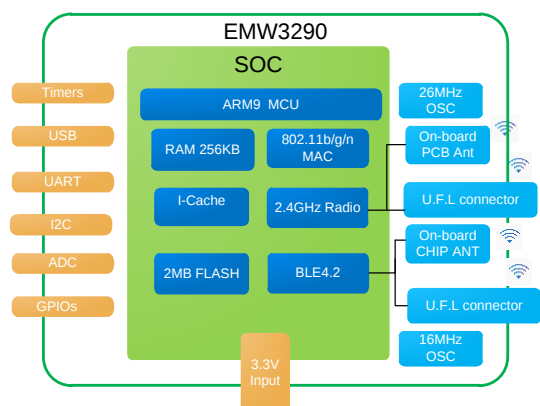
Application:

- Smart Transportation
- Smart Home/Home Appliances
- Industrial Automation
- Smart Security

Module Type

Type	WiFi antenna	BLE antenna
EMW3290-PP	PCB antenna	PCB antenna
EMW3290-PE	PCB antenna	IPEX carrier
EMW3290-EP	IPEX carrier	PCB antenna
EMW3290-EE	IPEX carrier	IPEX carrier

Hardware Block



EMW3290 hardware block

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Version update instructions

Date	version	update contents
2017-12-14	1.0	initial document
2017-12-18	1.1	Modify document format
2018-01-24	1.2	update the module dimension drawing

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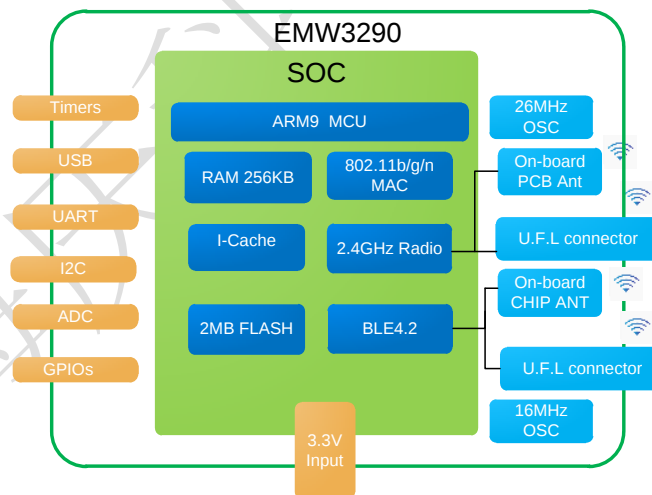
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1. Product introduction

EMW3290 is a cost-effective, dual-antenna embedded W-Fi & BLE module introduced by Shanghai MXCHIP. With dual on-board antennas, Wi-Fi and BLE support simultaneous data transmission and reception while ensuring isolation between antennas. EMW3290 highly integrated ARM9, WLAN MAC/Baseband/RF/BLE4.2, the highest frequency 120MHz, built-in 256KB SRAM, 2MB FLASH, 3.3V single power supply, stamp hole SMT or pin two installation methods, peripheral: UART / ADC / I2C / Up to 9 GPIOs.

The following figure shows the hardware block diagram of the EMW3290 module, including four major parts:

- ARM 9 main core
 - WLAN MAC/BB/RF/ANT/BLE4.2
 - Power management
 - Rich peripherals
1. ARM 9 CPU, operating frequency up to 120MHz, internal integrated 256K SRAM, 2MB FLASH, support for high-speed UART, I2C, ADC, and multiple GPIO ports
 2. 2MB on-chip Flash for custom firmware development
 3. Dual Antennas Support WiFi and BLE Simultaneously Send and Receive Data
 4. Input typical voltage: DC 3.3V

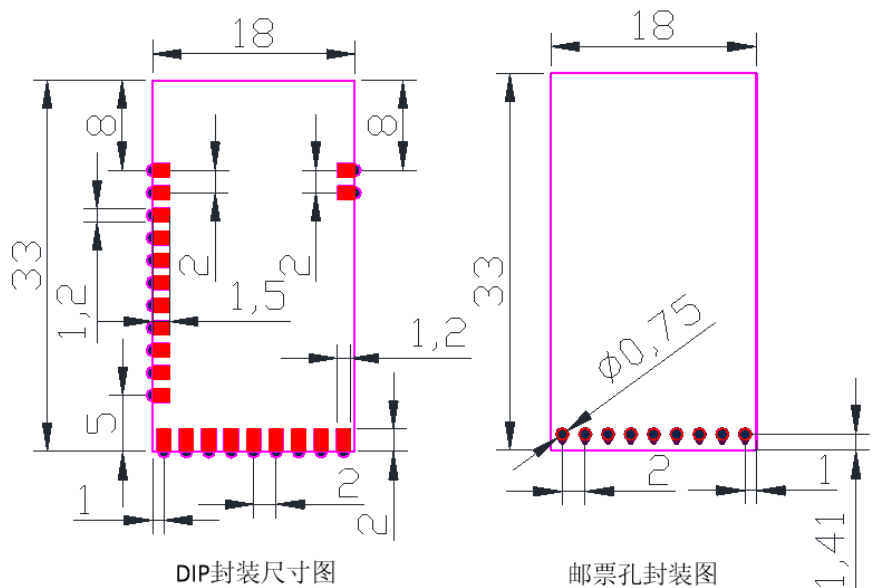


EMW3290 Hardware block diagram module interface

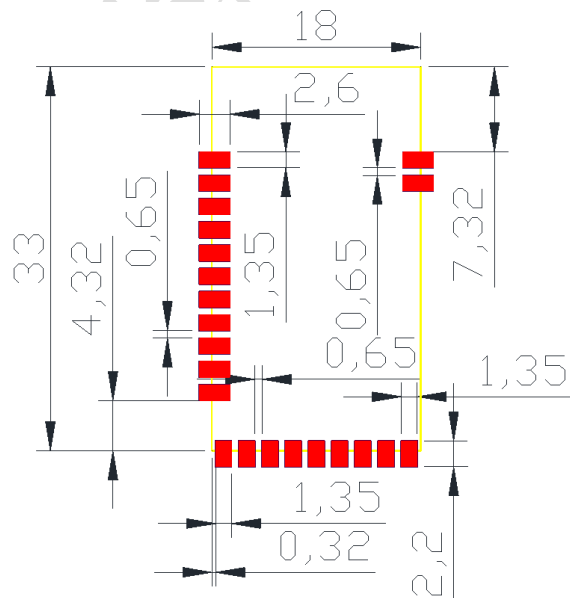
1.1 Pin arrangement

EMW3290 adopts DIP package and stamp hole package two kinds of interface design solutions. DIP package design effectively reduces the quality risk of the second patch; stamp package design facilitates customer debugging, easy disassembly and assembly, and provides diversity options for customer design.

Solder resistance window and pad size are the same, SMT recommends stencil thickness 0.12mm-0.14mm.



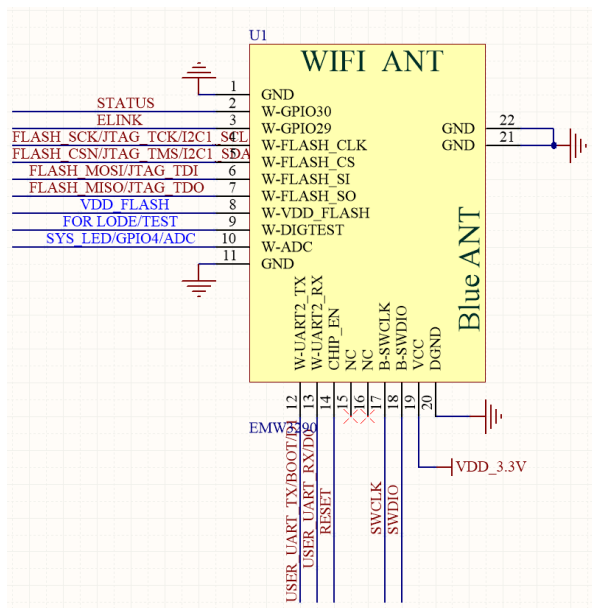
Picture 1 Module dimensions



Picture 2 Recommended PCB Package Size (Open Wire Size)

1.2 Pin definition

1.2.1 EMW3290 packaging definition



picture 3 EMW3290 package definition diagram

1.2.2 EMW3290 pin definition

table 1 EMW3290 version pin definition

Pin No.	Function1	Function2	Function3	Function4	Function5
1	GND				
2	USBDN	GPIO30			STATUS
3	USBDP	GPIO29			ELINK
4	FLASH_SCK	GPIO20	I2C1_SCL	JTAG_TCK	
5	FLASH_CSN	GPIO21	I2C1_SDA	JTAG_TMS	FLASH_CSN
6	FLASH_SI	GPIO22		JTAG_TDI	XHOUT,输出
7	FLASH_SO	GPIO23		JTAG_TDO	ADC3
8	VDDFLASH				
9	DIGTEST				

10		GPIO4			ADC1
11	GND				
12	UART2_TXD	GPIO31	I2C2_SCL		BOOT
13	UART2_RXD	GPIO1	I2C2_SDA		
14	CHIP_EN				
15	NC				
16	NC				
17	SWCLK				
18	SWDIO				
19	VCC				
20	GND				
21	GND				
22	GND				

Instructions:

- (1) PIN17 and PIN 18 are Bluetooth debug serial ports. Please do not use PCB design.
- (2) The BOOT pin power-on must be H or floating. Please pay special attention when designing the circuit.
- (3) The CHIP_EN pin should be left unconnected if not used, and it should be left unconnected if other pins are not used.
- (4) PIN6 features high-speed clock output.

2. Special function pins and programming instructions

In normal use, the BOOT cannot be low when powered on (the software has been pulled high, do not pull down the hardware on the line), combined with STATUS, ELINK to make the module into a different mode (0-low; 1-high).

BOOT	STATUS	ELINK	FUNCTION
0	1	1	BOOTLOADER
1	1	1	APP
0	1	0	ATE
0	0	1	QC

Through the UART (user) serial port pin can view the corresponding mode of print content, in the APP mode, the phone can be networked networking, normal communication with the APP; SRRC, FCC, CE and other certification must enter the ATE mode; production can be detected when the storage Use the QC mode; firmware update through the UART must enter the BOOTLOADER mode (BOOT is pulled low at power-up to enter this mode).

CHIP_EN is the system enable pin. When the pin is high, the module works normally. If it is low, the module stops working. Make sure the pin is high when power is on.

Burning instructions:

The module has four programming control pins, plus FLASH_SPI pin, a total of eight, for the module programming related pin, where VDD_FLASH, DIG_TEST, ADC/GPIO4, SPI_CLK (GPIO14) is the programming control pin, The four pins of FLASH_SPI are programming pins. Only JTAG is supported. There is no plan to support SWD in the later period. The correspondence is as follows:

- 1、 FLASH_MOSI for JTAG_TDI
- 2、 FLASH_SCK for JTAG_TCK
- 3、 FLASH_CSN for JTAG_TMS
- 4、 FLASH_MISO for JTAG_TDO

Module programming control pin

Pin	Status	Status
DIGTEST	H	0/NC
VDDFLASH	H	/

Pin	Status	Status
ADC/GPIO4	H	/
SPI_CLK(GPIO14)	0/NC	/
Working mode	DOWNLOAD BY FLASH_SPI	NORMAL

3. Electrical parameters

3.1 Working conditions

EMW3290 can cause unstable operation at input voltages below the minimum rated voltage. This should be taken care of when designing the power supply.

Table 2 Input voltage range

Symbol	instructions	condition	details			
			Min	Typical value	Maximum	Unit
VDD	Voltage		3.0	3.3	3.6	V

Working beyond the absolute maximum ratings of the module can cause permanent damage to the hardware. At the same time, working at maximum rated values for a long time can affect the reliability of the module.

Table 3 Absolute maximum voltage rating

Symbol	instructions	Min	Typical value	Unit
VDD	Module power input voltage	-0.3	3.6	V
VIN	GPIO pin input voltage	-0.3	3.6	V

3.2 Power consumption parameters

TBD

3.3 Working conditions

Table 4 Temperature and humidity conditions

Symbol	Name	Max	Unit
TSTG	storage temperature	-40 to +125	°C
TA	Working temperature	-20 to +85	°C
Humidity	Non-condensing, relative humidity	95	%

3.4 Electrostatic discharge

Table 5 Electrostatic discharge parameters

Symbol	Name	Name	Grade	Maximum	Unit
$V_{ESD}(HBM)$	Electrostatic discharge voltage (Human body model)	TA= +25 °C comply with JESD22-A114	2	2000	V
$V_{ESD}(CDM)$	Electrostatic discharge voltage (Discharge equipment model)	TA = +25 °C comply with JESD22-C101	II	500	

4. Antenna information

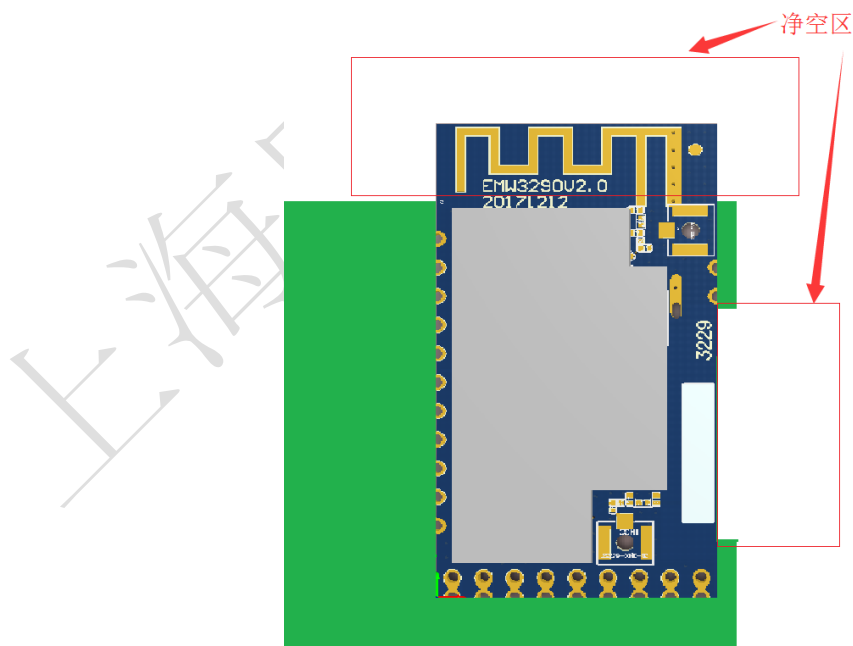
4.1 Antenna type

EMW3290's WiFi and BLE antennas both support the PCB antenna or IPEX carrier. The specific models are shown in the following table.

Module type	WiFi antenna	BLE antenna
EMW3290-PP	PCB antenna	Ceramic antenna
EMW3290-PE	PCB antenna	IPEX antenna
EMW3290-EP	IPEX antenna	Ceramic antenna
EMW3290-EE	IPEX antenna	IPEX antenna

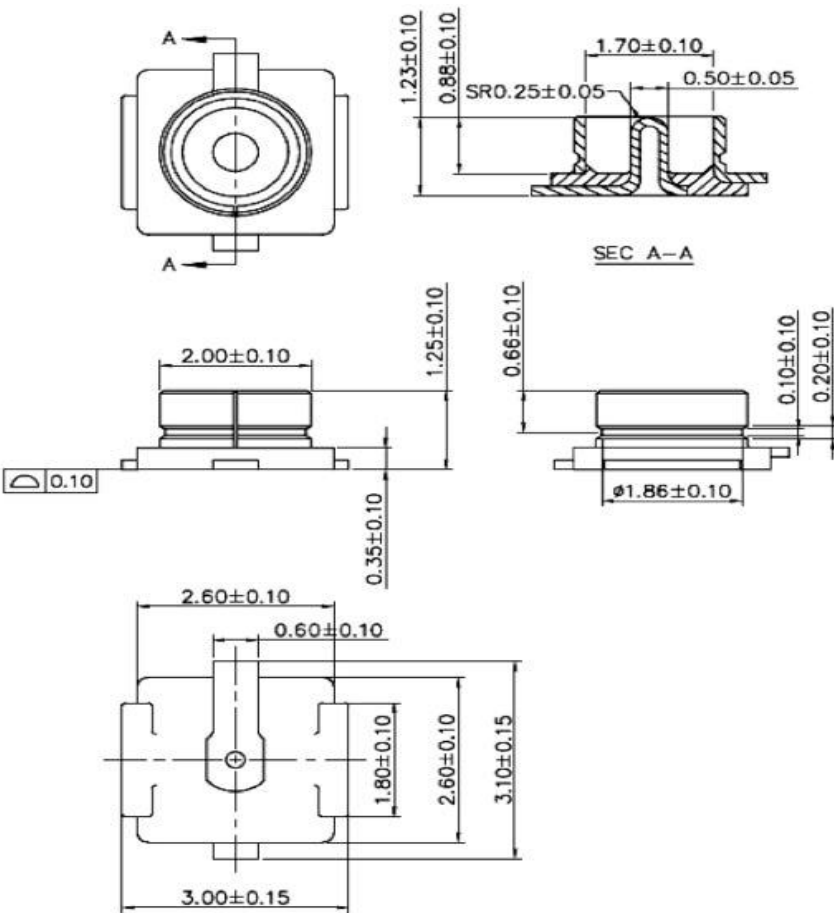
4.2 PCB antenna clearance area

In the PCB layout, when using an onboard antenna on the module, it is necessary to ensure that the module antenna extends directly out of the base plate, and the antenna that cannot be extended must also be hollowed out on the base plate and ensure that the distance from other metal devices is at least 16 mm. The area marked in the figure below needs to be away from metal devices, sensors, interference sources, and other materials that may cause signal interference.



picture 4 PCB Antenna minimum clearance area (unit: mm)

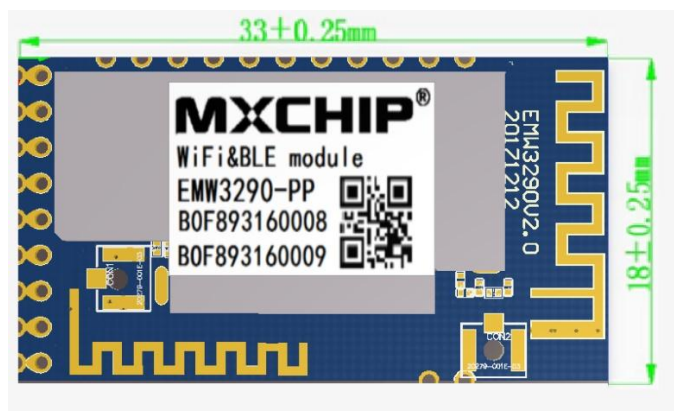
4.3 External antenna connector



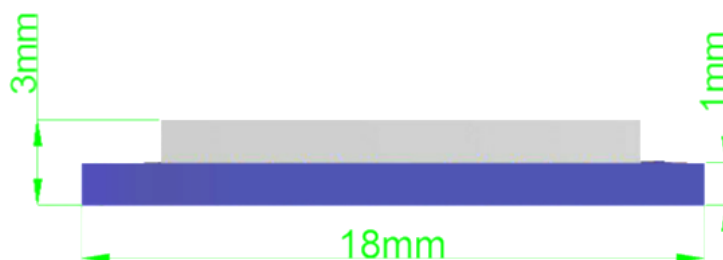
picture 5 External antenna connector size diagram

5. Assembly information and production guidance

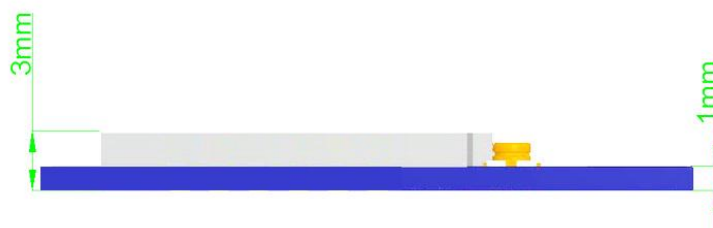
5.1 Assembly dimension drawing



Main view



Left view



Bottom view

Picture 6 EMW3290 three view (unit: mm)

5.2 Production guidance (please be sure to read carefully)

- Mxchip's factory stamp package modules should be patched by SMT machine, and must be patched within

24 hours after unpacking the firmware, otherwise, it is necessary to re-vacuum the package and to bake the module before patching.

- SMT patch requires instruments
 - (1) Reflow soldering machine
 - (2) AOI detector
 - (3) Caliber 6-8mm nozzle
- Baking requires equipment:
 - (1) Cabinet oven
 - (2) Anti-static and heat-resistant trays
 - (3) Anti-static gloves
- The clear module factory storage conditions are as follows (storage environment as shown in Section 5.4 of Figure 11):
 - Moisture-proof bags must be stored in a temperature <30°C and humidity <85% RH
 - Dry packaged products should have a shelf life of six months from the date of the package's seal.
 - The sealed package contains a humidity indicator card.



picture 7 Humidity card

- Mxchip's factory modules need to be baked, and the humidity indicator card and baking are as described below.
 - When unpacking, if the temperature and humidity indicator card readings are 30%, 40%, and 50% color rings are blue, the module needs to be continuously baked for 2 hours;
 - If the humidity indicator card reads 30% of the color circle to pink when unpacking, the module needs to be baked continuously for 4 hours.
 - If the humidity indicator card reads 30% and the 40% color wheel turns pink when unpacking, the module needs to be baked continuously for 6 hours.

- If the humidity indicator card reads 30%, 40%, and 50% of the color rings all turn pink when unpacking, the module needs to be baked continuously for 12 hours.

Baking parameters are as follows:

- Baking temperature: $125^{\circ}\text{C}\pm 5^{\circ}\text{C}$;
 - Alarm temperature is set to 130°C ;
 - After cooling $<36^{\circ}\text{C}$ under natural conditions, SMT patching can be performed;
 - Drying times: 1 time;
 - If there is no welding for more than 12 hours after baking, please bake again.
- If the unpacking time exceeds 3 months, it is forbidden to use the SMT process to solder this batch of modules. Because the PCB underfills the gold process and the pad oxidation is severe for more than 3 months, the SMT placement may result in the occurrence of imaginary or miss welding. All kinds of problems brought by our company do not bear the corresponding responsibility;
 - Please perform ESD (electrostatic discharge, electrostatic discharge) protection on the module before SMT placement.
 - Please carry out the SMT patch according to the reflow profile, the peak temperature is 245°C , and the reflow temperature curve is shown in Figure 10 in Section 5.5;
 - In order to ensure the qualified rate of reflow soldering, please take 10% of the product for visual inspection and AOI testing for the first time to ensure that the furnace temperature control, device adsorption method, and placement method are reasonable; after mass production, it is recommended to extract 5-10 pieces per hour. Perform visual inspection and AOI testing.

5.3 Precautions

- Operators in various positions throughout the production process must wear electrostatic gloves;
- Do not exceed baking time when baking;
- Do not add explosive, flammable or corrosive substances during baking;
- During baking, the module applies high temperature trays into the oven to maintain air circulation between each module while avoiding direct contact between the module and the inner wall of the oven;
- Please close the oven door when baking to ensure the oven is closed to prevent temperature leakage and affect the baking effect;
- Do not open the door when the oven is running. If it must be opened, try to shorten the open time.
- After the baking is completed, the module should be cooled to $<36^{\circ}\text{C}$ and then it should be put on an electrostatic glove to avoid burns.
- During operation, prevent water or dirt on the bottom of the module.

- Kyocera factory module temperature and humidity control level is Level3, storage and baking conditions according to IPC/JEDEC J-STD-020.

5.4 Storage conditions

	CAUTION	LEVEL
	This bag contains MOISTURE-SENSITIVE DEVICES	3
If Blank, see adjacent bar code label		
1. Calculated shelf life in sealed bag: 12 months at $< 40^{\circ}\text{C}$ and $< 90\%$ relative humidity (RH)		
2. Peak package body temperature: <u>260</u> $^{\circ}\text{C}$ If Blank, see adjacent bar code label		
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must		
a) Mounted within: <u>168</u> hrs. of factory conditions If Blank, see adjacent bar code label		
$\leq 30^{\circ}\text{C}/60\%\text{RH}$, OR		
b) Stored at $<10\%$ RH		
4. Devices require bake, before mounting, if:		
a) Humidity Indicator Card is $> 10\%$ when read at $23 \pm 5^{\circ}\text{C}$		
b) 3a or 3b not met.		
5. If baking is required, devices may be baked for 48 hrs. at $125 \pm 5^{\circ}\text{C}$		
Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure		
Bag Seal Date: _____ If Blank, see adjacent bar code label		
Note: Level and body temperature defined by IPC/JEDEC J-STD-020		

picture 8 Storage condition diagram

5.5 Secondary reflow temperature curve

Use solder paste model: SAC305, lead-free. No more than 2 times.

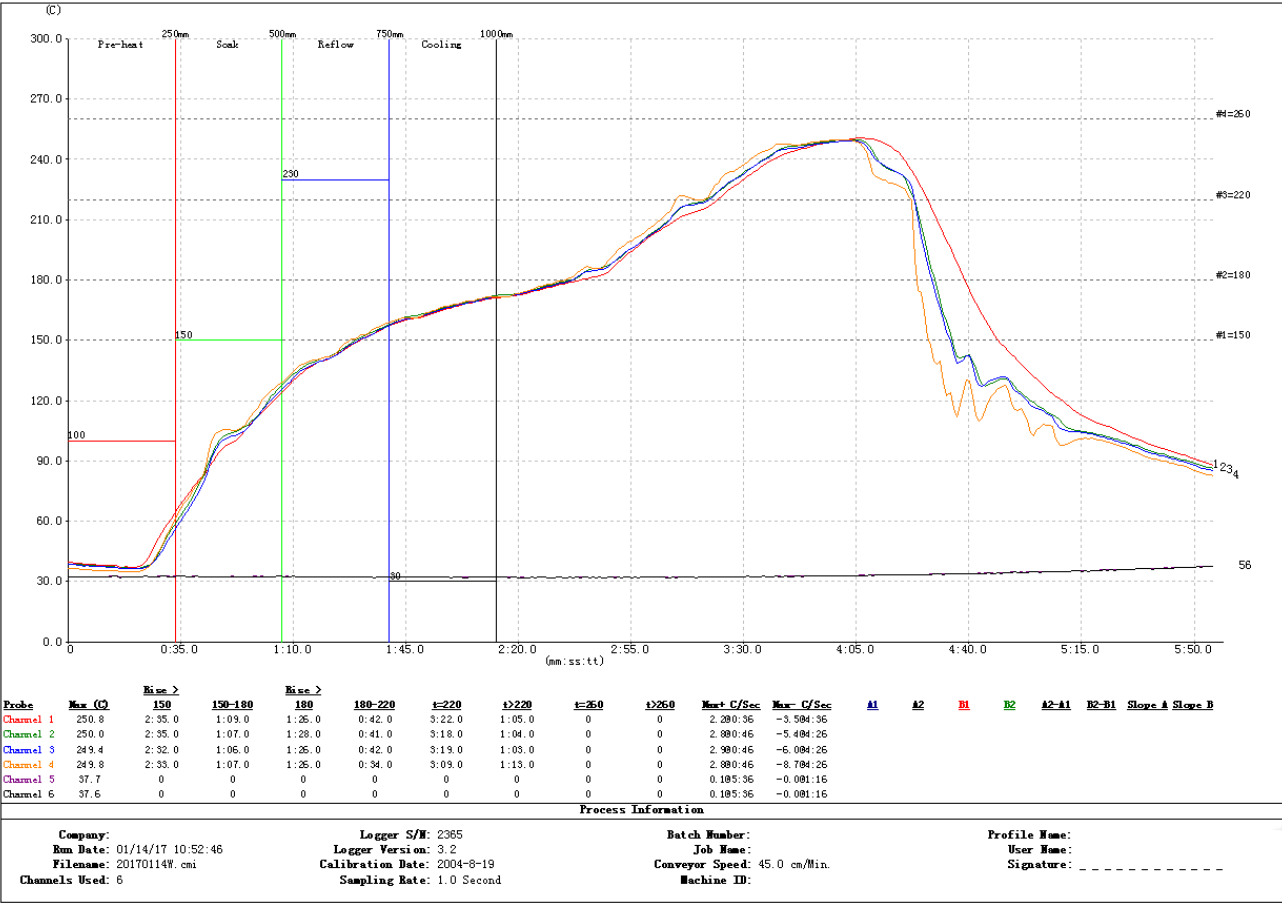


FIG. 9 reference reflow temperature curve.

5.6 Reference circuit

EMW3290 reference circuit is shown in FIG. 13 power reference circuit, figure 14 USB port reference circuit, figure 15 external interface reference design for user reference.

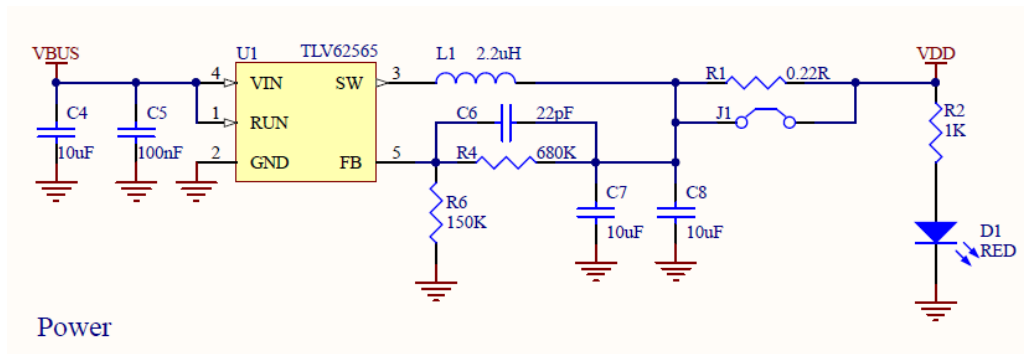


FIG. 10 power reference circuit.

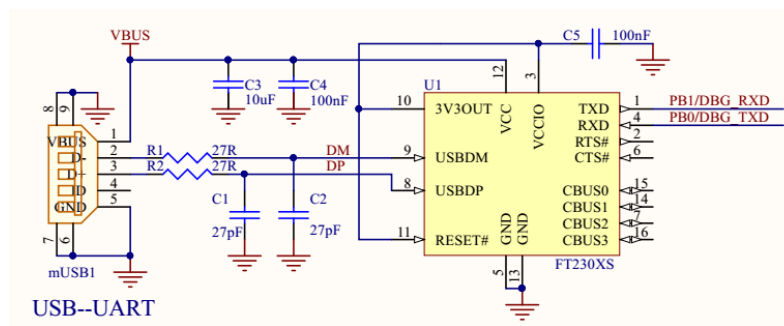


FIG. 11 USB port reference circuit.

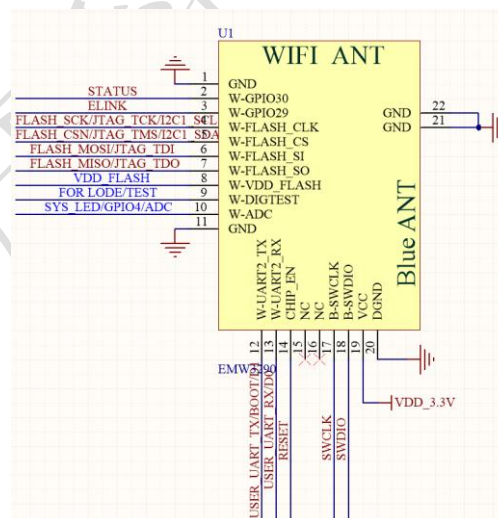
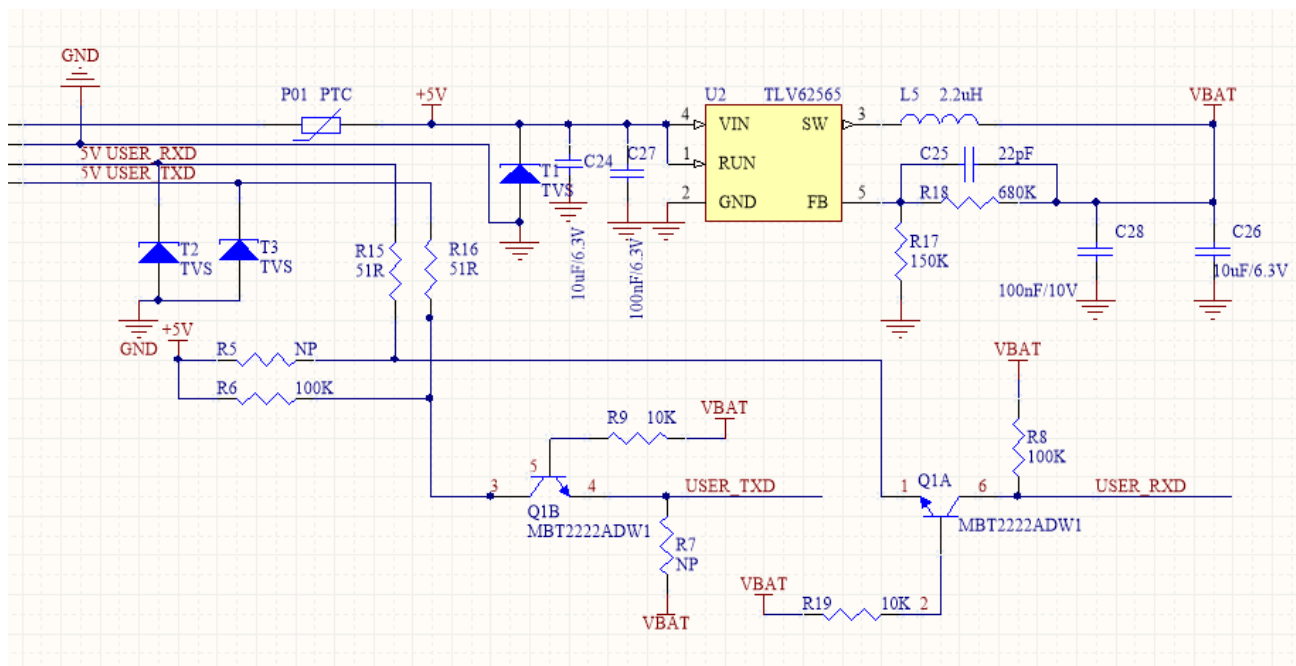


Figure 12 EMW3290 external interface reference design.

EMW3290 UART is 3.3v UART. If the UART of the chip is 5V, the 5V UART needs to be converted to 3.3V UART to communicate with EMW3290 UART. Please refer to the circuit shown in figure 16 for conversion circuit

of 5v-3.3 V UART.



Picture 9 3.3V UART- 5V UART Conversion circuit

6. Module MOQ and packaging information.

Table 17 module MOQ and packaging information.

P/N	MOQ(pcs)	Shipping packing method (tray/tape)	Number of modules per tray. (pcs)	Number of pallets. (pcs)	Number of modules per box. (pcs)
EMW3290-P EMW3290-E		tray			

7. Sales and technical support information.

If you need to consult or buy this product., Please call Shanghai MxChip information technology co., LTD during office hours.

office hours.:

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

Contact number: +86-21-52655026.

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