W80
Hardware Design

WIFI Module

SIMCom Wireless Solutions Limited
Building B, SIM Technology Building, No.633, Jinzhong Road
Changning District, Shanghai P.R. China
Tel: 86-21-31575100
support@simcom.com
www.simcom.com

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SIMCom Wireless Solutions Limited
Building B, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai P.R.China
Tel: +86 21 31575100
Email: simcom@simcom.com

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Date	Version	Description of change	Author
2020-5-22	V1.00	Initial release	Zhiqiang Liu Xiaobo Bai
2020-12-25	V1.01	Add timing of power on/off Add power supply data Update ESD data Update BT function Update Figure 13 and Figure 4	Zhiqiang Liu
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1 Introduction

This document describes the electronic specifications, RF specifications, interfaces, mechanical characteristics and testing results of the W80 module. With the help of this document, in combination with our application manual and user guide, customers can quickly apply W80 module into wireless applications.

1.1 Product Outline

The W80 is a small, low-power, low-cost Wi-Fi 6 and Bluetooth v5.1 module based on Qualcomm QCA-6391 chipset. The module can be used in car networking, wireless routing, and other wireless terminals. The module is designed to be used together with SIMCom SIM8200 series modules to establish WLAN and Bluetooth connections. W80 supports 2X2+2X2 MU-MIMO and provides a maximum data rate up to 1774.5Mbps.

1.2 Hardware Interface Overview

W80 support the following interfaces:

- Power supply
- One I2S interface
- One PCIe *1 lane interface
- One COEX_UART interface
- One 32KHz clock input interface
- One BT_UART interface
- Two WLAN antenna interfaces
- LAA control interfaces
- GPIOs

NOTE

1. If unused I2S feature, please keep open.
2. SIM8200 series modules do not support BT_I2S feature.

1.3 Hardware Block Diagram

The following figure shows the hardware block diagram of W80:

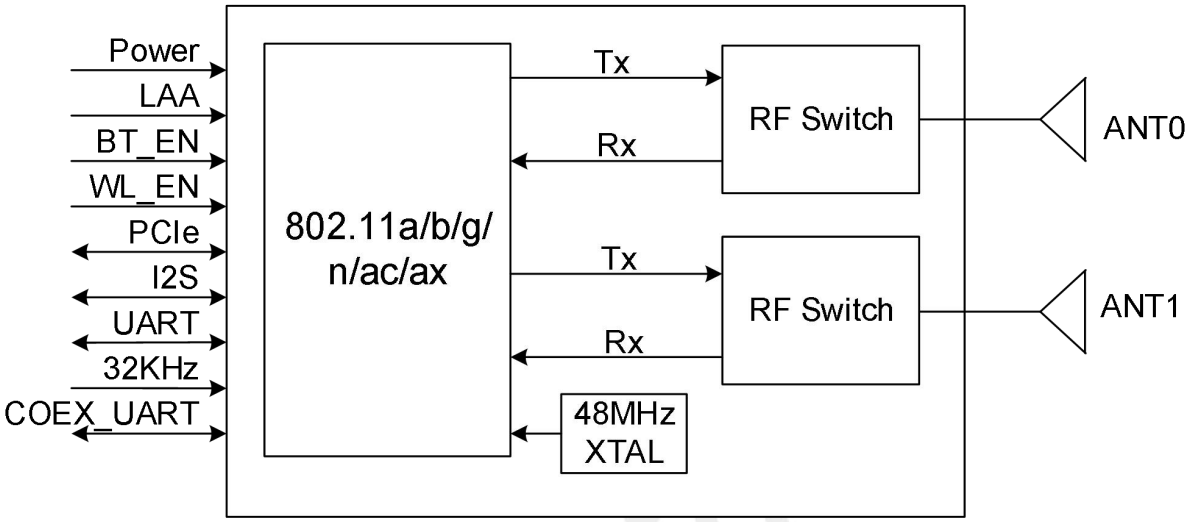

Figure 1：W80 hardware block diagram

1.4 Feature Overview

Table 1：Key features

Feature	Implementation
Power Supply	VPH : 3.3~4.4 V S2E_1P224 : 1.22~1.42 V S3E_0P824 : 0.82~1.0 V S4E_1P904 : 1.8~2.1 V VDD_IO : 1.71~2.0 V
Date Rate	802.11b：1，2，5.5，11Mbps 802.11g\a：6，9，12，18，24，36，48，54Mbps 802.11n_HT20：MCS0~MCS7 802.11n_HT40：MCS0~MCS7 802.11n_HT80：MCS0~MCS7 802.11ac_HT20: MCS0~MCS9 802.11ac_HT40: MCS0~MCS9 802.11ac_HT80: MCS0~MCS9 802.11ax_HT20: MCS0~MCS11 802.11ax_HT40: MCS0~MCS11 802.11ax_HT80: MCS0~MCS11
Transmitting power	802.11b/11Mbps：20dBm 802.11a/g/54Mbps：15dBm 802.11n_HT20/MCS7：15dBm 802.11n_HT40/MCS7：15dBm 802.11n_HT80/MCS7：15dBm 802.11ac_HT20/MCS9：14dBm

	802.11ac_HT40/MCS9：14dBm 802.11ac_HT80/MCS9：14dBm 802.11ax_HT20/MCS11：12dBm 802.11ax_HT40/MCS11：12dBm 802.11ax_HT80/MCS11：12dBm
WLAN Standard	IEEE 802.11a/b/g/n/ac/ax
Modulation Method	DSSS (1/2Mbps)，CCK(1/2/5.5/11Mbps)，OFDM（6/9/12/18/24/36/48/54Mbps）,OFDM technology combined with BPSK, QPSK, 16-qam , 64-qam, 256-qam, 1024-qam; 820.11b adopts CCK and DSSS modulation technology
PCIe Interface	One lane PCIe interface, support PCIe Gen 2.0
UART Interface	● One UART interface ● Data rate up to 3.2 Mbps
I2S Interface	One I2S interface, the I2S also can be configured as PCM SIM8200 series modules do not support BT_I2S feature
Antenna Interface	2X2+2X2
Physical characteristics	Size：24.0mm*17.0mm*2.6mm Weight：TBD
Temperature range	Normal operation：-30°C ~ +70°C Storage temperature：-40°C ~ +90°C

1.5 W80 and SIM8200G Connect Diagram

The following figure shows the connect diagram of W80 and SIM8200G, the details please refer the SIM8200G reference design.

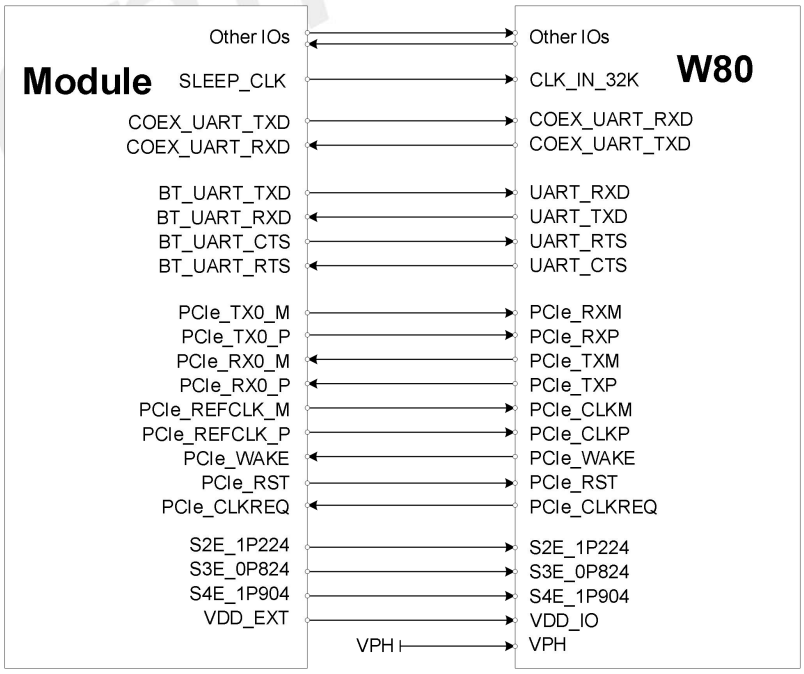

Figure 2：W80 and SIM8200G connect diagram

2 Package Information

2.1 Pin Assignment Overview

All functions of the W80 will be provided through 90 pins that will be connected to the customer's platform. The following figure is a high-level view of the pin assignment of the W80.

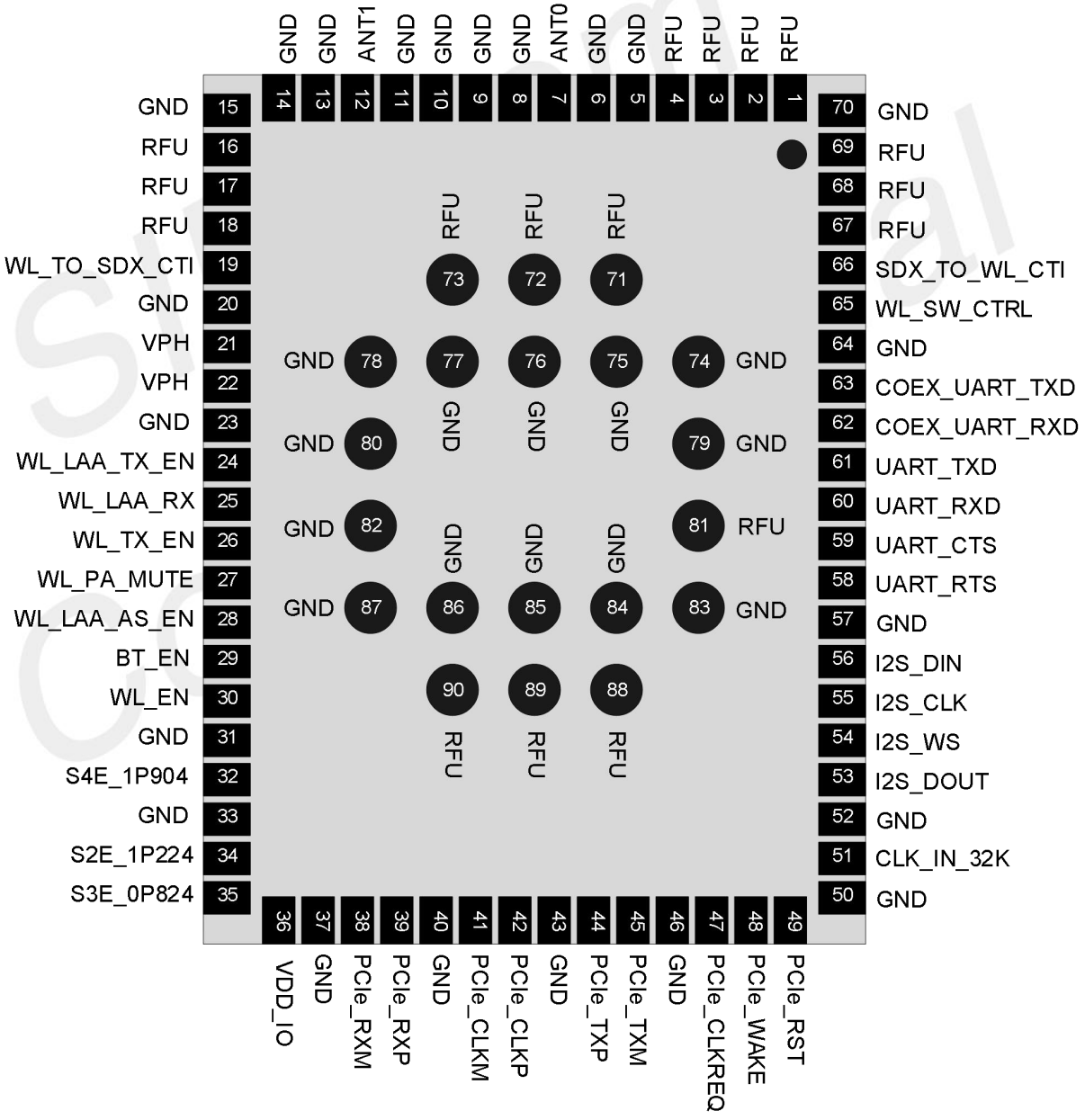

Figure 3：Pin assignment

2.2 Pin Description

Table 2：Pin description

Pin name	Pin number	I/O	Description	Comment
Power supply				
VPH	21,22	PI	Power for PA	
S2E_1P224	34	PI	Power for PCIe and RFA	
S3E_0P824	35	PI	Power for RFA and others	
S4E_1P904	32	PI	Power for PCIe and RFA	
VDD_IO	36	PI	Power for IO	
GND	5,6,8,9,10,11,13,14,15,20,23,31,33,37,40,43,46,50,52,57,64,70,74,75,76,77,78,79,80,82,83,84,85,86,87		Ground	
LAA control				
WL_LAA_TX_EN	24	DI	WLAN XFEM control LAA enable	If unused, please connect to GND
WL_LAA_RX	25	DI	WLAN XFEM control for LAA receiver	
WL_LAA_AS_EN	28	DI	Allow LAA to control WLAN FEM during WLAN sleep mode	If unused, please keep open
Moudle control				
WL_TX_EN	26	DO	WLAN XFEM control for WLAN TX enable	If unused, please pull down to GND by a 10K resistor externally.
WL_PA_MUTE	27	DI	WLAN XFEM control for PA mute	If unused, please connect to GND
BT_EN	29	DI	BT enable signal from Host	If unused, please keep open
WL_EN	30	DI	WLAN enable signal from Host	
WL_SW_CTRL	65	DO	Switch control	
SDX_TO_WL_CTI	66	DO	GPIO	If unused, please keep open
WL_TO_SDX_CTI	19	DO	GPIO	
PCIe interface				
PCIe_RXM	38	-	PCIe receive minus	Required 90Ω differential
PCIe_RXP	39	-	PCIe receive plus	

PCIe_CLKM	41	-	PCIe reference clock minus	impedance
PCIe_CLKP	42	-	PCIe reference clock plus	
PCIe_TXM	45	-	PCIe transmit minus	
PCIe_TXP	44	-	PCIe transmit plus	
PCIe_RST	49	DI	PCIe reset.	
PCIe_CLKREQ	47	DO	PCIe clock request.	These pins have been pulled up to 1.8V internally
PCIe_WAKE	48	DO	PCIe wake-up	
I2S interface				
I2S_DIN	56	DI	BT I2S serial data Input 0 for audio	If unused, please keep open
I2S_CLK	55	DI	BT I2S continuous serial clock 0 for audio	
I2S_WS	54	DI	BT I2S word select 0 for audio	
I2S_DOUT	53	DO	BT I2S serial data output 0 for audio	
UART interface				
COEX_UART_TXD	63	DO	LTE coexistence UART TXD	If unused, please pull down to GND by a 100K resistor externally.
COEX_UART_RXD	62	DI	LTE coexistence UART RXD	If unused, please connect to GND
UART_TXD	61	DO	BT UART transmit data for HCI messaging	
UART_RXD	60	DI	BT UART receive data for HCI messaging	
UART_CTS	59	DI	BT UART clear to send for HCI messaging	
UART_RTS	58	DO	BT UART request to send for HCI messaging	
Clock interface				
CLK_IN_32K	51	AI	Sleep clock input	
Antenna interface				
ANT0	7	AIO	WLAN/BT antenna0 interface	
ANT1	12	AIO	WLAN antenna1 interface	
RFU interface				
RFU	1,2,3,4,16,17,18, 67,68,69,71,72, 73,81,88,89,90		Reserved for future use	Please keep open

NOTE

1. Unused and RFU pins should keep open.
2. All Power and GND pins should be connected to the customer's main PCB.
3. All control signals, PCIe interface, I2S interface, UART interface and Clock interface work in 1.8V voltage domain.

2.3 Mechanical Dimensions

The following figure shows the mechanical dimensions of W80.

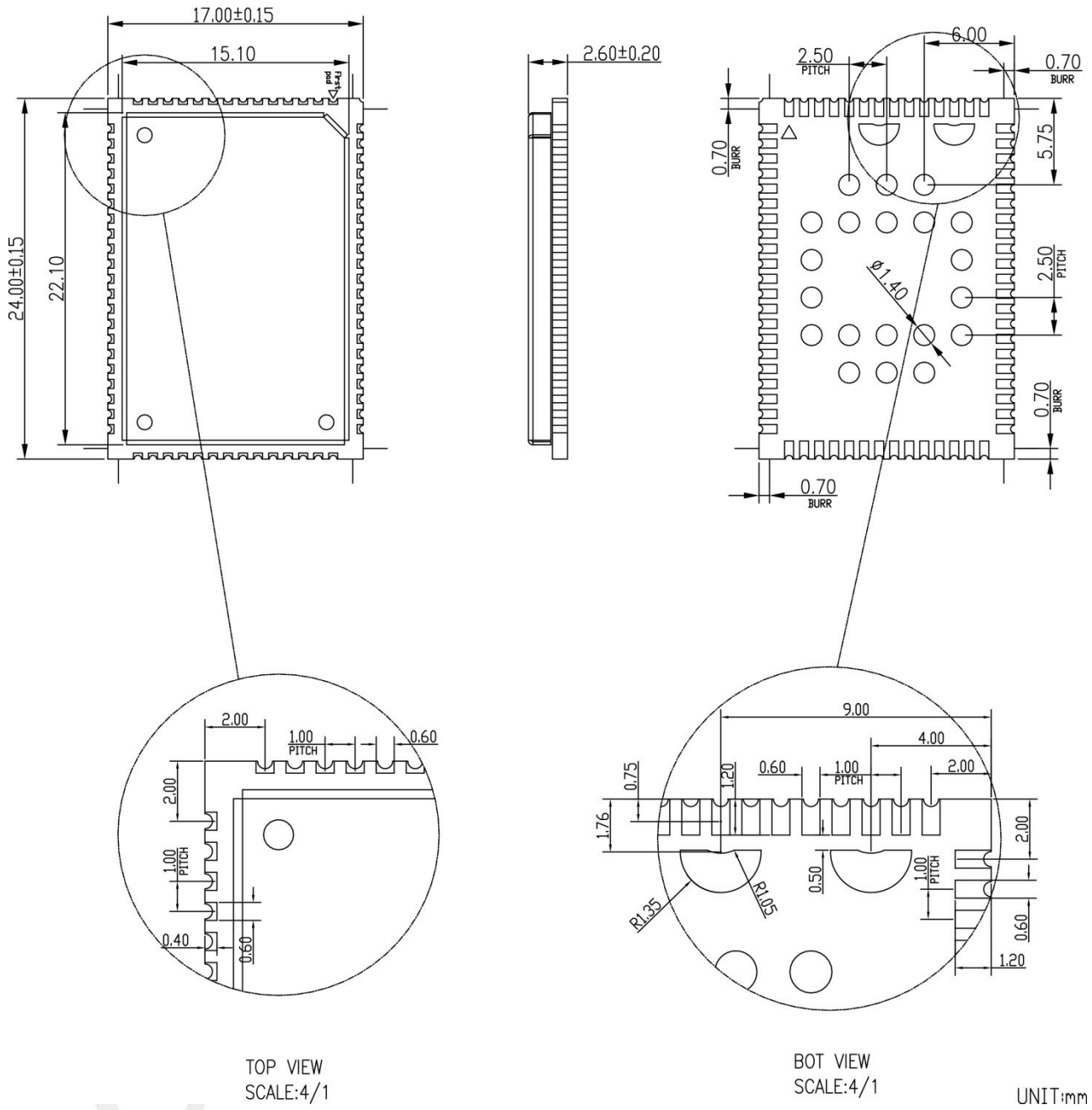

Figure 4：Dimensions of W80 (Unit: mm)

3 Interface Application

3.1 Power Supply

Ensure the module works properly, all power and GND pins should be connected; when all powers are supplied W80 will work well together with SIM8200 series modules.
When W80 and SIM8200 series modules are actually used together, the following current consumption data in Table 3 is measured:

Table 3: Power electronic characteristics

Symbol	Description	Min.	Typ.	Max.	Unit
VPH	Module VPH power supply voltage.	3.3	3.8	4.4	V
	Module VPH peak current.	-	-	1.2	A
S2E_1P224	Module S2E_1P224 power supply voltage.	1.22	1.28	1.42	V
	Module S2E_1P224 peak current.	-	-	0.2	A
S3E_0P824	Module S3E_0P824 power supply voltage.	0.82	0.88	1.0	V
	Module S3E_0P824 peak current.	-	-	0.35	A
S4E_1P904	Module S4E_1P904 power supply voltage.	1.8	1.88	2.1	V
	Module S4E_1P904 peak current.	-	-	0.2	A
VDD_IO	Module VDD_IO power supply voltage.	1.71	1.8	2.0	V
	Module VDD_IO peak current.	-	-	10	mA

NOTE

Test conditions:
1. The mounting capacitance on the VPH network is 10uF+100nF+33pF.
2. The mounting capacitance on the S2E_1P224 network is 1uF+1uF +100nF.
3. The mounting capacitance on the S3E_0P824 network is 1uF+1uF +100nF.
4. The mounting capacitance on the S4E_1P904 network is 1uF+1uF+100nF.
5. The mounting capacitance on the VDD_IO network is 1uF+1uF +100nF.

Timing of power on ：

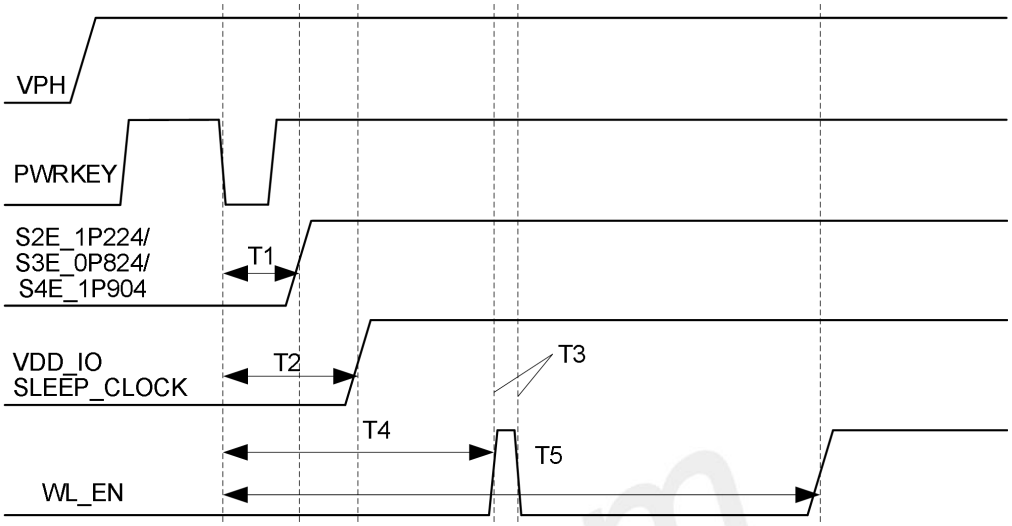

Figure 5：Timing of power on

Table 4: Power on timing and electronic characteristic

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_1	The time from power-on action to S4E_1P904, S3E_0P824, S2E_1P224 ready.	-	40	-	ms
T_2	The time from power-on action to VDD_IO, SLEEP_CLOCK ready.	-	42.4	-	ms
T_3	The time of W80 initialize.		615		ms
T_4	The time from power-on action to W80 initialize.	-	5.04	-	s
T_5	The time from power-on action to WLAN enable.		17.54		s

NOTE

The PWRKEY is the control signal of SIM8200 series modules.

Timing of power off ：

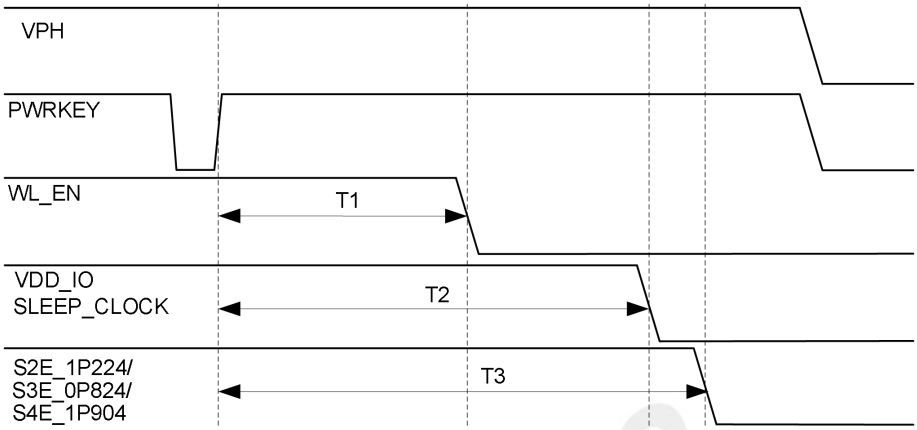

Figure 6：Timing of power off

Table 5: Power on timing and electronic characteristic

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_1	The time from power-off action to W80 disable.	-	7.6	-	s
T_2	The time from power-off action to VDD_IO, SLEEP_CLOCK close.	-	11.2	-	s
T_3	The time from power-off action to S4E_1P904, S3E_0P824, S2E_1P224 close.	-	11.21	-	s

NOTE

The PWRKEY is the control of SIM8200 series modules.

Table 6：Definition of Power and GND pins

Pin name	Pin number	I/O	Description	Comment
VPH	21,22	PI	Power for PA	
S2E_1P224	34	PI	Power for PCIe and RFA	
S3E_0P824	35	PI	Power for RFA and others	
S4E_1P904	32	PI	Power for PCIe and RFA	
VDD_IO	36	PI	Power for IO	
GND	5,6,8,9,10,11,13,14,15,20, 23,31,33,37,40,43,46,50, 52,57,64,70,74,75,76,77, 78,79,80,82,83,84,85,86, 87		Ground	

S4E_1P904, S2E_1P224, S3E_0P824 and VDD_IO should be connected to SIM8200 series modules.

Power supply layout guidelines:

- The trace of VPH needs to meet the width of 1500mA current at least.
- The trace of S4E_1P904 needs to meet the width of 500mA current at least.
- The trace of S2E_1P224 needs to meet the width of 500mA current at least.
- The trace of S3E_0P824 needs to meet the width of 500mA current at least.
- The trace of VDD_IO needs to meet the width of 100mA current at least.

3.2 I2S Interface*

I2S is for audio feature with BT function, under developing now.

NOTE

1. "*" means under development.
2. If unused, please keep open.
3. SIM8200 series modules do not support this feature.

3.3 Clock Interface

The 32KHz clock is for sleep mode of Bluetooth, the routing line of it should be as short as possible and also need GND protection.

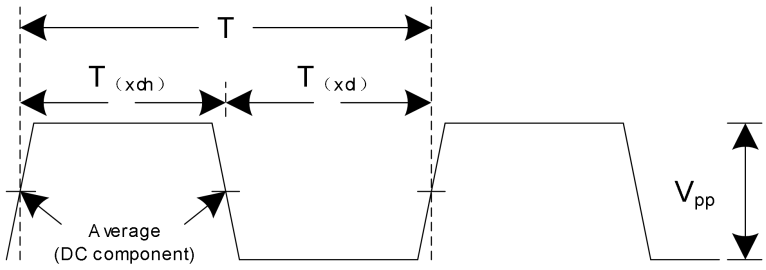

Figure 7：Timing of 32KHz

Table 7：Sleep clock

Symbol	Parameter	Min.	Typ.	Max.	Unit
T(xoh)	Sleep clock logic high	4.58	-	25.94	us
T(xol)	Sleep clock logic low	4.58	-	25.94	us
T	Sleep clock period	-	30.5208	-	us
F	Sleep clock frequency	-	32.7645	-	KHz
Vpp	Peak-to-peak voltage	-	1.8	-	V

3.4 LAA and Module Control Interface

3.4.1 3.4.1 LAA Control

Table 8：LAA control

Pin name	Pin number	I/O	Description	Comment
WL_LAA_TX_EN	24	DI	WLAN XFEM control LAA enable	If unused, please connect to GND
WL_LAA_RX	25	DI	WLAN XFEM control for LAA receiver	
WL_LAA_AS_EN	28	DI	Allow LAA to control WLAN FEM during WLAN sleep mode	If unused, please keep open

3.4.2 Module Control

Table 9：Module control

Pin name	Pin number	I/O	Description	Comment
WL_TX_EN	26	DO	WLAN XFEM control for WLAN TX enable	If unused, please pull down to GND by a 10K resistor externally.
WL_PA_MUTE	27	DI	WLAN XFEM control for PA mute	If unused, please connect to GND
BT_EN	29	DI	BT enable signal from Host	If unused, please keep open
WL_EN	30	DI	WLAN enable signal from Host	
WL_SW_CTRL	65	DO	Switch control	
SDX_TO_WL_CTI	66	DO	GPIO	If unused, please keep open
WL_TO_SDX_CTI	19	DO	GPIO	

3.5 COEX UART

To reduce the mutual interference between LTE and WIFI, please connect COEX_UART to SIM8200 series modules.

3.6 BT function

BT_UART is for communication with SIM8200 series modules, it is used to communicate between W80 and SIM8200 series modules, so when you want to use BT function, be sure to connect it to SIM8200 series modules.

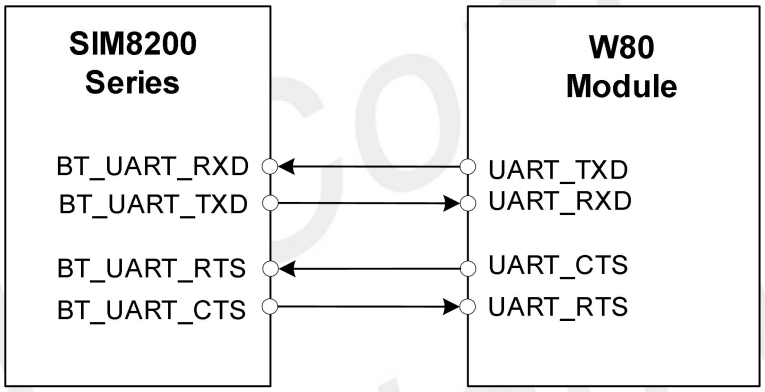

Figure 8：BT function reference circuit

Table 10：BT UART

Pin name	Pin number	I/O	Description	Comment
UART_TXD	61	DO	BT UART transmit data for HCI messaging	
UART_RXD	60	DI	BT UART receive data for HCI messaging	
UART_CTS	59	DI	BT UART clear to send for HCI messaging	
UART_RTS	58	DO	BT UART request to send for HCI messaging	

NOTE

When using the BT function, please make sure that PCIe is connect.

3.7 PCIe Interface

PCIe is for communication with SIM8200 series modules, which required differential trace impedance is 90±10%Ω, and the following figure is the PCIe reference circuit:

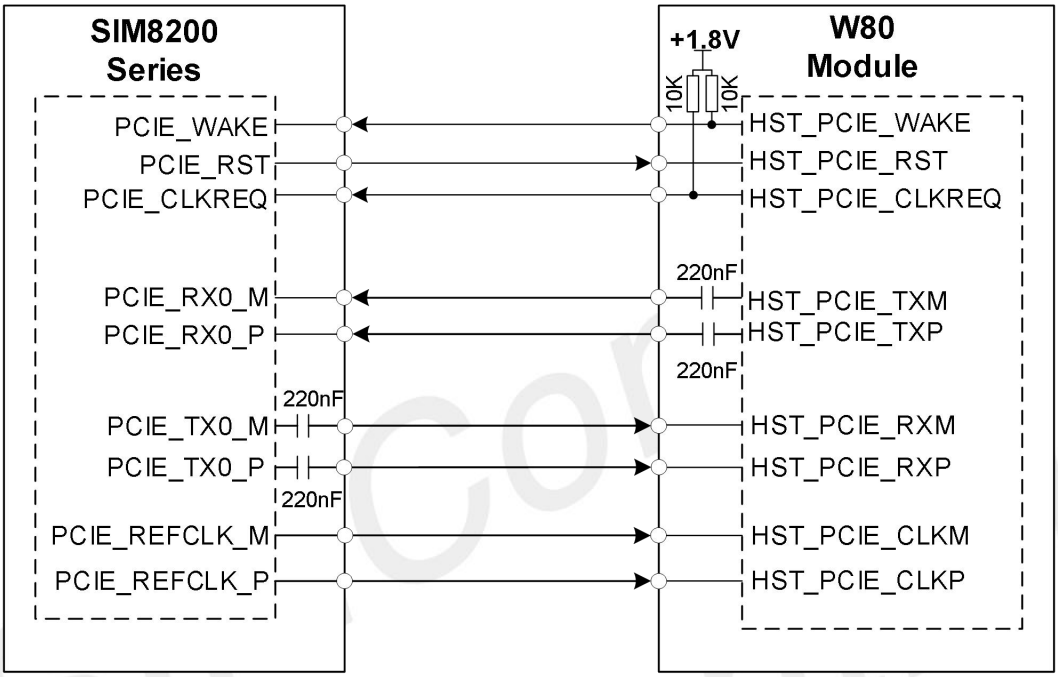

Figure 9：PCIe interface reference circuit

Table 11：PCIe Interface

Pin name	Pin number	I/O	Description	Comment
PCIe_RXM	38	-	PCIe receive minus	Required 90Ω differential impedance
PCIe_RXP	39	-	PCIe receive plus	
PCIe_CLKM	41	-	PCIe reference clock minus	
PCIe_CLKP	42	-	PCIe reference clock plus	
PCIe_TXM	44	-	PCIe transmit minus	
PCIe_TXP	45	-	PCIe transmit plus	
PCIe_RST	49	DI	PCIe reset.	
PCIe_CLKREQ	47	DO	PCIe clock request.	These pins have been pulled up to 1.8V internally
PCIe_WAKE	48	DO	PCIe wake-up	

3.8 Antenna Interface

Pin7 and pin12 are for antenna, the characteristic impedance is 50Ω.

3.8.1 Frequency band

Table 12：Frequency band

Parameter	Value	Unit
Frequency range	2412~2484	MHz
	5180~5825	MHz

3.8.2 Reference design for RF

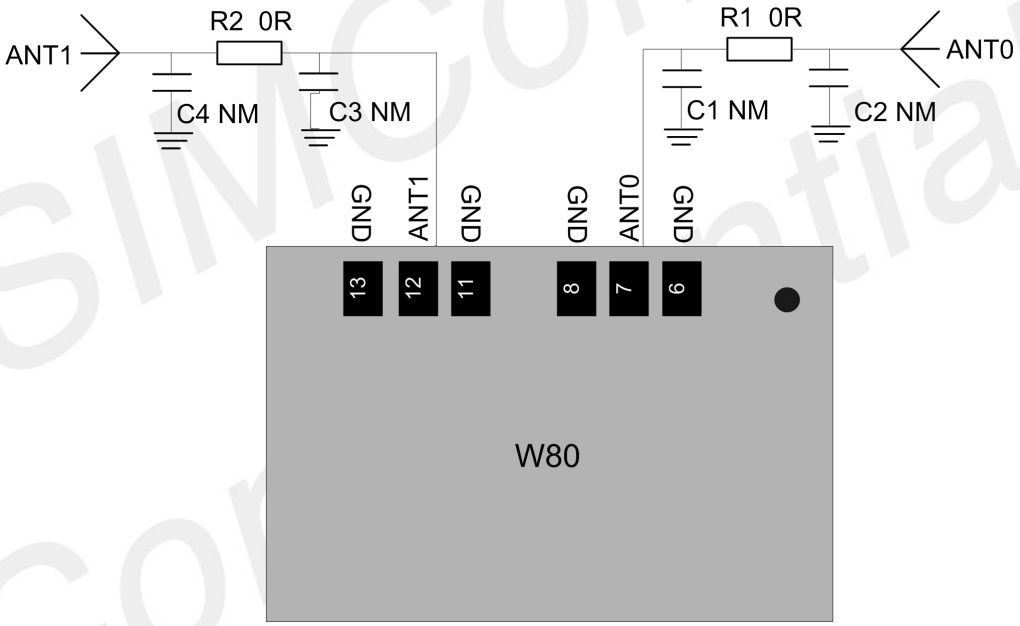

Figure 10：Reference design of RF

W80 provides two RF welding disc interfaces for connecting external antennas. The RF wiring connected to the module RF antenna welding disc is made with a micro-strip line or other type impedance line. The impedance must be controlled at about 50 ohms, and the routing line is as short as possible. In order to obtain better RF performance, two GND pads on each side of the RF interface are needed.

3.8.3 Requirement for antenna installation

Table 13：Requirement for antenna installation

Parameter	Requirement
Frequency range	2412~2484MHz 5180~5825MHz
SWR	≤2:1
Line loss	<1dB
Gain（dBi）	>1
Input impedance（Ω）	50
Direction	Vertical

4 Electrical Specifications

4.1 Absolute Maximum Ratings

Table 14：Absolute maximum ratings

Parameter	Description	Min	Type	Max	Unit
VPH	Power for PA	-	-	4.8	V
S2E_1P224	Power for PCIe and RFA	-	-	1.5	V
S3E_0P824	Power for RFA and others	-	-	1.1	V
S4E_1P904	Power for PCIe and RFA	-	-	2.1	V
VDD_IO	Power for IO	-	-	2.0	V

4.2 Operating Conditions

Table 15：Power recommended operating ratings

Parameter	Description	Min	Type	Max	Unit
VPH	Power for PA	3.3	3.8	4.4	V
S2E_1P224	Power for PCIe and RFA	1.22	1.28	1.42	V
S3E_0P824	Power for RFA and others	0.82	0.88	1.0	V
S4E_1P904	Power for PCIe and RFA	1.8	1.88	2.1	V
VDD_IO	Power for IO	1.71	1.8	2.0	V

Table 16：1.8V digital I/O characteristics

Parameter	Description	Min	Type	Max	Unit
VIH	Input high level	1.26	-	2.1	V
VIL	Input low level	0	-	0.54	V
VOH	Output high level	1.35	-	1.8	V
VOL	Output low level	0	-	0.45	V

4.3 RF Characteristics

Table 17：Transmit power per chain

Data	Type	Unit
2.4G 802.11b @11Mbps	20.0	dBm
2.4G 802.11g @6Mbps	18.0	dBm
2.4G 802.11g @54Mbps	15.0	dBm
2.4G 802.11n，HT20 @MCS0	18.0	dBm
2.4G 802.11n，HT40 @MCS0	18.0	dBm
2.4G 802.11n，HT20 @MCS7	15.0	dBm
2.4G 802.11n，HT40 @MCS7	15.0	dBm
2.4G 802.11ac，VHT20 @MCS9	14.0	dBm
2.4G 802.11ac，VHT40 @MCS9	14.0	dBm
2.4G 802.11ax，HE20 @MCS11	12.0	dBm
2.4G 802.11ax，HE40 @MCS11	12.0	dBm
5G 802.11a @6Mbps	18.0	dBm
5G 802.11a @54Mbps	15.0	dBm
5G 802.11n，HT20 @MCS0	18.0	dBm
5G 802.11n，HT40 @MCS0	18.0	dBm
5G 802.11n，HT80 @MCS0	18.0	dBm
5G 802.11n，HT20 @MCS7	15.0	dBm
5G 802.11n，HT40 @MCS7	15.0	dBm
5G 802.11n，HT80 @MCS7	15.0	dBm
5G 802.11ac，VHT20 @MCS9	14.0	dBm
5G 802.11ac，VHT40 @MCS9	14.0	dBm
5G 802.11ac，VHT80 @MCS9	14.0	dBm
5G 802.11ax，HE20 @MCS11	12.0	dBm
5G 802.11ax，HE40 @MCS11	12.0	dBm
5G 802.11ax，HE80 @MCS11	12.0	dBm

Table 18：Receive Sensitivity at 2.4G for 1X1 configuration

Band	Type	Unit
2.4G11b@1Mbps	TBD	dBm
2.4G 11b@11 Mbps	TBD	dBm
2.4G 11g@6Mbps	TBD	dBm
2.4G 11g@54Mbps	TBD	dBm
2.4G 11n/ac@HT20-MCS0	TBD	dBm
2.4G 11n/ac@HT20-MCS7	TBD	dBm
2.4G 11n/ac@HT40-MCS0	TBD	dBm
2.4G 11n/ac@HT40-MCS7	TBD	dBm
2.4G 11ac@VHT20-MCS9	TBD	dBm
2.4G 11ac@VHT40-MCS9	TBD	dBm

2.4G 11ax@HE20-MCS0	TBD	dBm
2.4G 11ax@HE20-MCS11	-63	dBm
2.4G 11ax@HE40-MCS0	TBD	dBm
2.4G 11ax@HE40-MCS11	TBD	dBm

Table 19：Receive Sensitivity at 5G for 1X1 configuration

Band	Type	Unit
5G 11a@6Mbps	TBD	dBm
5G 11a@54Mbps	TBD	dBm
5G 11n/ac@HT20-MCS0	TBD	dBm
5G 11n/ac@HT20-MCS7	TBD	dBm
5G 11n/ac@HT40-MCS0	TBD	dBm
5G 11n/ac@HT40-MCS7	TBD	dBm
5G 11n/ac@HT80-MCS0	TBD	dBm
5G 11n/ac@HT80-MCS7	TBD	dBm
5G 11ac@VHT20-MCS9	TBD	dBm
5G 11ac@VHT40-MCS9	TBD	dBm
5G 11ac@VHT80-MCS9	TBD	dBm
5G 11ax@HE20-MCS0	TBD	dBm
5G 11ax@HE20-MCS11	-62	dBm
5G 11ax@HE40-MCS0	TBD	dBm
5G 11ax@HE40-MCS11	TBD	dBm
5G 11ax@HE80-MCS0	TBD	dBm
5G 11ax@HE80-MCS11	TBD	dBm

4.4 ESD

Module is sensitive to ESD in the process of storage, transporting, and assembling. When Module is mounted on the customers' main board, the ESD components should be placed beside the connectors which human body may touch, such as switches, USB interface, etc. The following table shows the Module ESD measurement performance.

Table 20：The ESD performance measurement table (Temperature：25℃，humidity：45%)

Parameter	Connect（±kv）	Air（±kv）
GND	±3	±6
Power	±2	±5
Antenna	±2	±5
PCIe	±2	±4
I2S	±2	±4
UART	±2	±4
Other PADs	±2	±4

NOTE

Test conditions:

1. Test conditions: the external of the module has surge protection diodes and ESD protection diodes
2. The data in Table 20 were tested using SIMCom EVB.

5 Manufacturing

5.1 TOP and Bottom View of W80

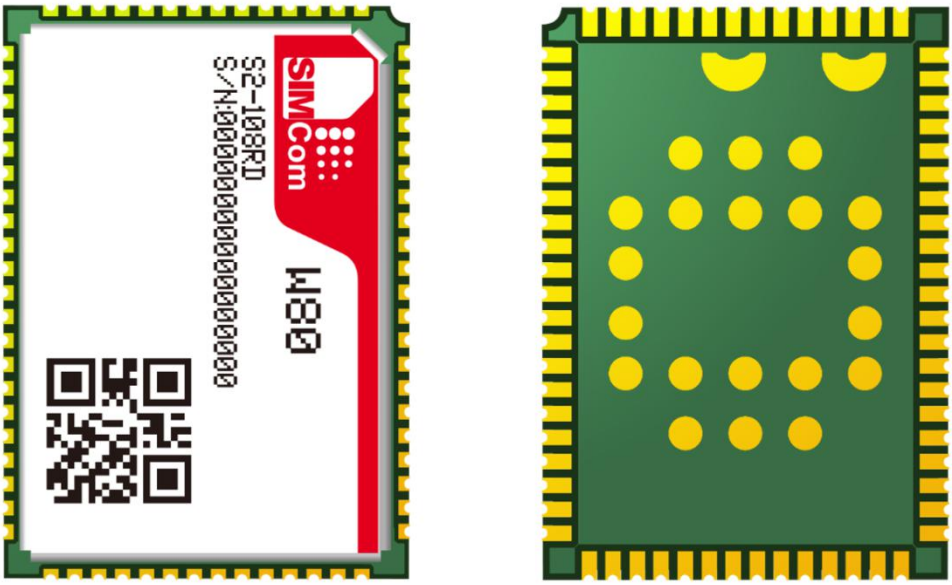

Figure 11：Top and bottom view of W80

5.2 Label Description Information

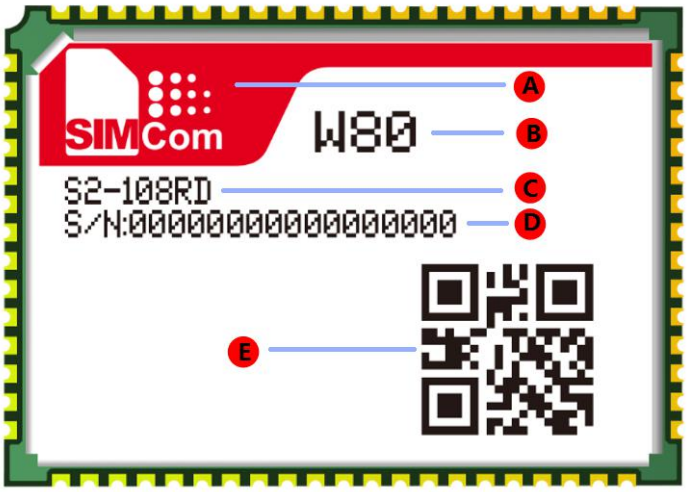

Figure 12：Label description of module

Table 18：Label description of module information

No.	Description
A	LOGO
B	Project name
C	Product code
D	Serial number
E	QR code

NOTE

Figure 11 and Figure 12 are the effect diagrams of the module, for reference only. Please refer to the actual product for appearance.

5.3 Recommended PCB Footprint

The following figure shows the PCB footprint of W80.

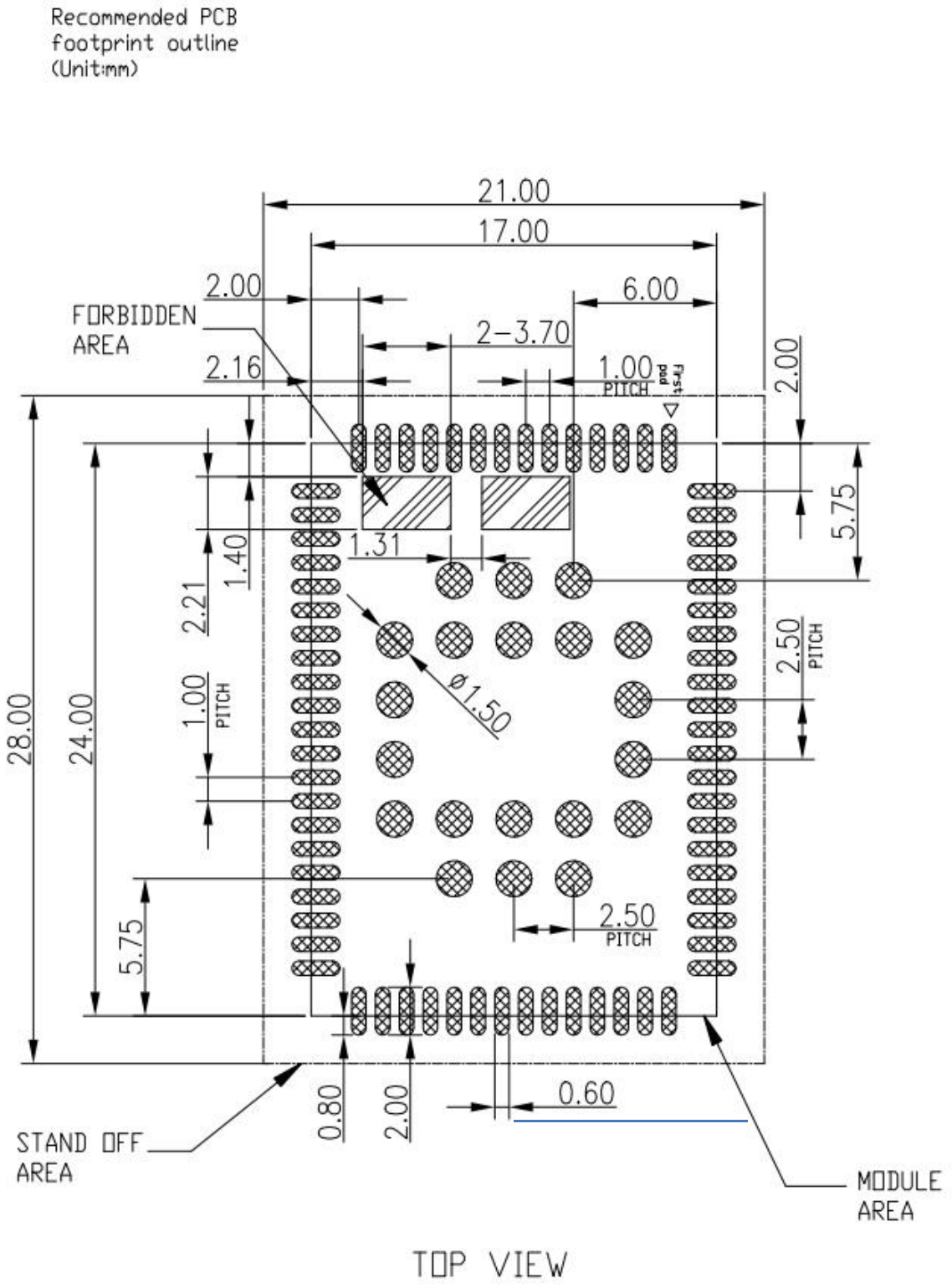

Figure 13：Recommended PCB footprint

5.4 Recommended SMT Stencil

The following figure shows the SMT stencil of W80.

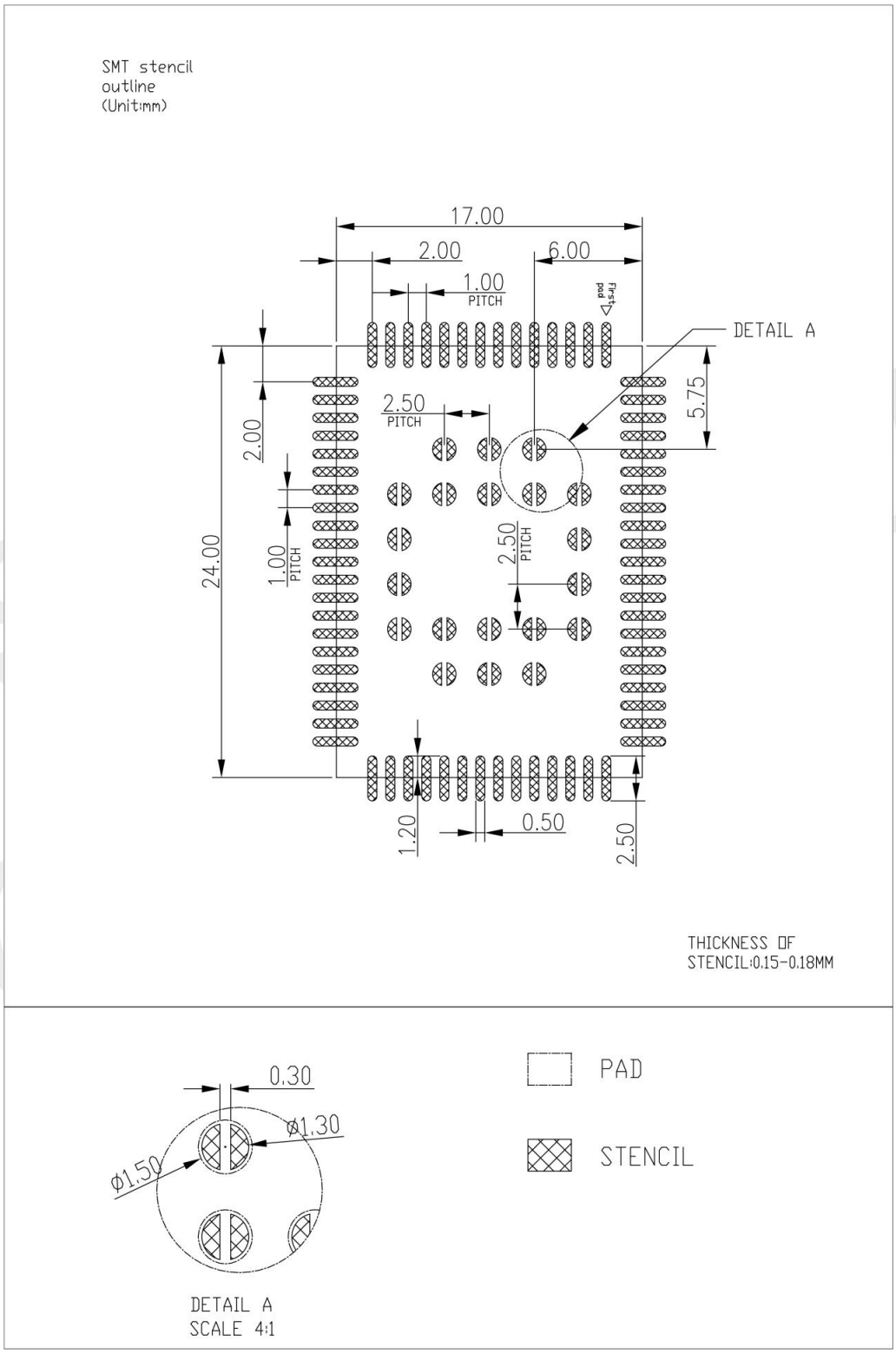

Figure 14：Recommended SMT stencil

5.5 Recommended SMT Reflow Profile

SIMCom provides a typical soldering profile. Therefore, the soldering profile shown below is only a generic recommendation and should be adjusted to the specific application and manufacturing constraints.

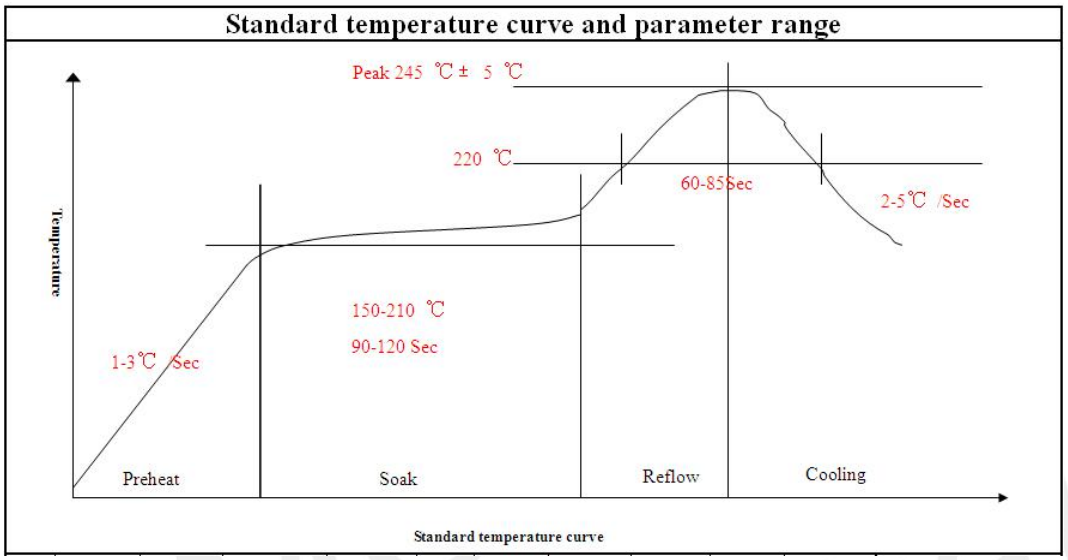

Figure 15：The ramp-soak-spike reflow profile of module

5.6 Moisture Sensitivity Level (MSL)

Module is susceptible to damage induced by absorbed moisture and high temperature. A package's moisture-sensitivity level (MSL) indicates its ability to withstand exposure after it is removed from its shipment bag, while it is on the factory floor awaiting PCB installation. A low MSL rating is better than a high rating; a low MSL device can be exposed on the factory floor longer than a high MSL device. All pertinent MSL ratings are summarized in Table 22.

Table 22：MSL ratings summary

MSL	Out-of-bag floor life	Comments
1	Unlimited	≤+30℃/85% RH
2	1 year	≤+30℃/60% RH
2a	4 weeks	≤+30℃/60% RH
3	168 hours	≤+30℃/60% RH
4	72 hours	≤+30℃/60% RH
5	48 hours	≤+30℃/60% RH
5a	24 hours	≤+30℃/60% RH
6	Mandatory bake before use. After bake, it must be	≤+30℃/60% RH

	reflowed within the time limit specified on the label.

Module is qualified to Moisture Sensitivity Level (MSL) 3 in accordance with JEDEC J-STD-033. If the prescribed time limit is exceeded, users should bake module for 192 hours in drying equipment (<5% RH) at 40+5/-0°C, or 72 hours at 85+5/-5°C. Note that plastic tray is not heat-resistant, and only can be baked at 45° C.

NOTE

IPC / JEDEC J-STD-033 standard must be followed for production and storage.

5.7 Baking Requirements

It is necessary to bake modules if the prescribed time limit has been exceeded. The baking conditions are specified in Table 23. Note that if baking is required, the devices must be transferred into trays that can be baked to at least 125°C.

Table 23：Baking requirements

Baking conditions options	Duration
40°C±5°C, <5% RH	192 hours
120°C±5°C, <5% RH	4 hours

6 Packaging

Module support tray packaging. The packaging process is shown in the following figures.

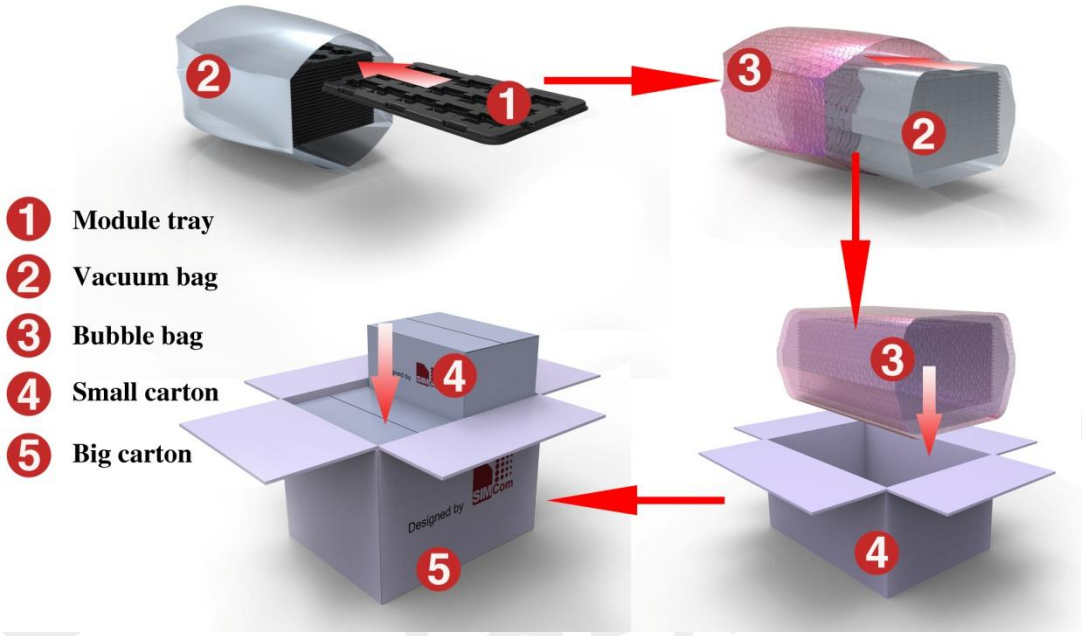

Figure 16：Packaging diagram

Module tray drawing：

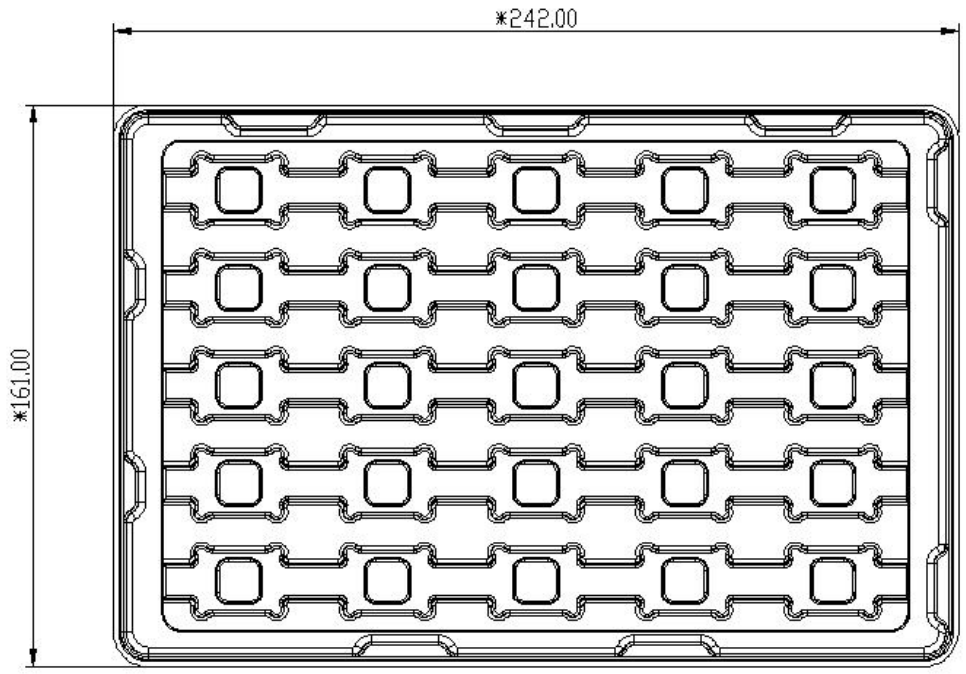

Figure 17：Tray drawing

Table 24：Tray size

Length（±3mm）	Width（±3mm）	Number
242.0	161.0	25

Small carton drawing：

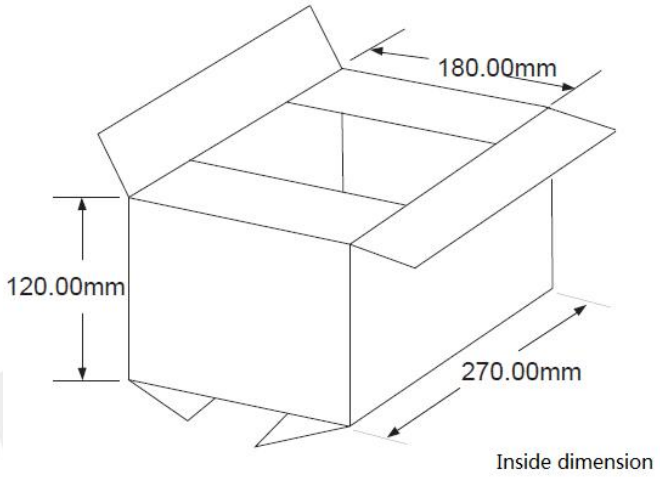

Figure 18：Small carton drawing

Table 25：Small carton size

Length（±10mm）	Width（±10mm）	Height（±10mm）	Number
270	180	120	25*20=500

Big carton drawing：

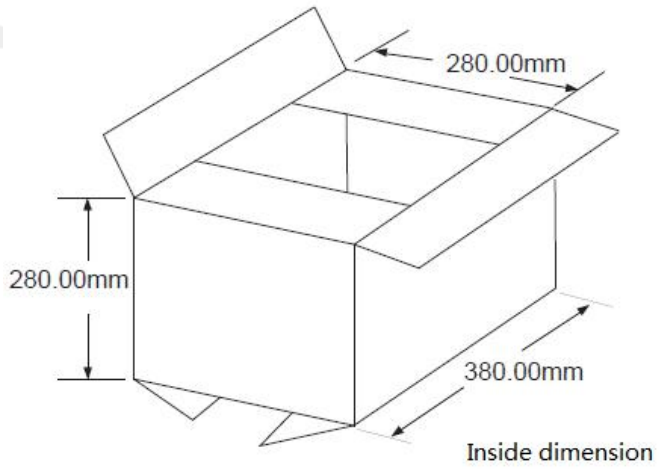

Figure 19：Big carton drawing

Table 26：Big carton size

Length（±10mm）	Width（±10mm）	Height（±10mm）	Number
380	280	280	500*4=2000

7 Appendix

7.1 Related Documents

Table 27：Related documents

NO	Title	Description
[1]	SIM8200G-LGA_KDL	W80 and SIM8200G reference design

7.2 Terms and Abbreviations

Table 28：Terms and abbreviations

Abbreviation	Description
BPSK	Binary Phase Shift Keying
B	Bidirectional digital input
CCK	Complementary Code Keying
DSSS	Direct Sequence Spread Spectrum
NC	Not connect
ESD	Electrostatic Discharge
I/O	Input/Output
LTE	Long Term Evolution
Mbps	Million Bits Per Second
MCS	Modulation and Coding Scheme
OFDM	Orthogonal Frequency Division Multiplexing
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RX	Receive Direction
TX	Transmitting Direction
VSWR	Voltage Standing Wave Ratio
WLAN	Wireless Local Area Networks
LAA	Limited Access Authorization
MIMO	Multiple Input Multiple Output
I2S	Inter-IC Sound
LTE	Long Term Evolution
PCIe	Peripheral Component Interface Express
UART	Universal Asynchronous Receiver Transmitter

7.3 Safety Caution

Table 29：Safety caution

Marks	Requirements
	When in a hospital or other health care facility, observe the restrictions about the use of mobiles. Switch the cellular terminal or mobile off, medical equipment may be sensitive and not operate normally due to RF energy interference.
	Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it is switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Forgetting to think much of these instructions may impact the flight safety, or offend local legal action, or both.
	Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.
	Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.
	Road safety comes first! Do not use a hand-held cellular terminal or mobile when driving a vehicle, unless it is securely mounted in a holder for hands free operation. Before making a call with a hand-held terminal or mobile, park the vehicle.
	GSM cellular terminals or mobiles operate over radio frequency signals and cellular networks and cannot be guaranteed to connect in all conditions, especially with a mobile fee or an invalid SIM card. While you are in this condition and need emergent help, please remember to use emergency calls. In order to make or receive calls, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength. Some networks do not allow for emergency call if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may have to deactivate those features before you can make an emergency call. Also, some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile.