H158A-SM

Wi-Fi Single-band 1X1 802.11b/g/n & BLE5.0

SDIO Module Datasheet

H158A-SM Module Datasheet

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Customer Approval : _____ Company

_____ Title

_____ Signature

_____ Date

_____ Fn-Link

Revision History

| Version	Date	Revision Content	Draft	Approved
1.0	2020/12/23	New version	Lxy	SZS
1.1	2021/3/27	Remove shielding	Lxy	Szs
1.2	2021/4/6	Upgrade tx power limit	Lxy	Szs
1.3	2021/6/11	Added planeness information	Lxy	Lgp
1.4	2021/7/5	Revise BLE type module P/N	Lxy	Lgp
1.5	2021/8/16	Added -01 type P/N	LXY	QJP
1.5	2021/09/04	Update to WiFi+BLE version	LXY	QJP
1.6	2021/09/10	Update BLE type P/N	LXY	QJP

CONTENTS

1 Overview

1.1 Introduction

H158A-SM is a highly integrated and excellent performance Wireless LAN (WLAN) SDIO2.0 network interface device. Based on iCOMM chipset SV6158M. support 802.11b/g/n +BLE5.0 standard.

1.2 Features

- Operate at ISM frequency bands (2.4GHz)
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Wi-Fi 1 T 1 R allow data rates supporting up to 150 Mbps PHY rates
- 1bit/4bits mode supported,clock up to 50Mhz
- The SV6158M supports BLE Master, Slave,Advertiser, Scanner roles. It supports standard HCI in BLE side.
- Bluetooth 5.0 Low Energy
- SIG Mesh v1.01 supported

Block Diagram:
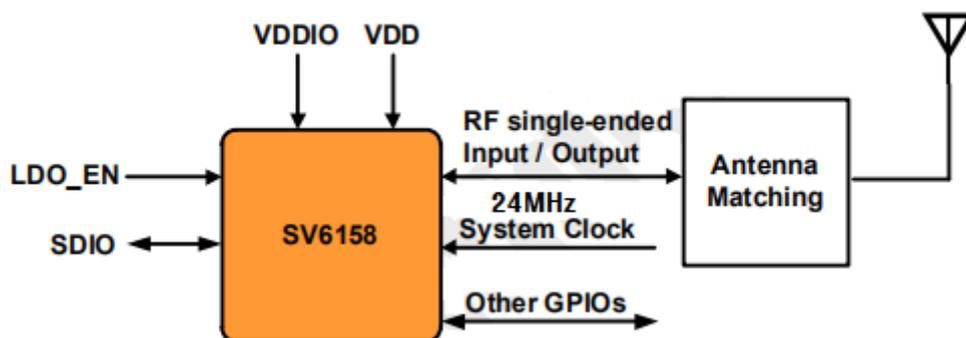
1.3 General Specification

Model Name	H158A-SM
Product Description	Support Wi-Fi +BLE5.0 functionalities
Dimension	L x W x T: 12 x 12 x 1.7 mm
Wi-Fi Interface	Support SDIO
Operating temperature	-10°C to 65°C
Storage temperature	-40°C to +85°C

1.4 Recommended Operating Rating

	Min.	Typ.	Max.	Unit
Operating Temperature	-10	25	65	deg.C
VBAT	3.0	3.3	3.6	V
VDDIO	1.7	1.8 or 3.3	3.6	V

1.5 Current informations

Vcc=3.3V, Ta=25°C, unit: mA	
current	mean
11b 11Mbps TX mode	186.6
11g 54Mbps TX mode	158
11n HT20 MCS7 TX mode	159.4
11n HT40 MCS7 TX mode	161
RX mode	35.7
Saving mode DTIM3	0.21
BLE TX	90.3
BLE RX	33

※1.6 EEPROM Information

WI-FI

Vendor ID	-
Product ID	-

2 General Specification

2.1 Wi-Fi RF Specifications

function	Description	
WLAN STANDARD	IEEE 802.11 b/g/n Wi-Fi compliant	
frequency range	2412MHz to 2462MHz 2422MHz to 2452MHz	
Support channel	802.11b/g/n(HT20):11 802.11n(HT40):7	
Spectrum Mask	IEEE	
Frequency Error	±20PPM	
Output Power	BLE:7.42dBm; 2.4G:16.84dBm power correspondingother ratesisconfigured by the driver	
receiving sensitivity	sRGB	standard values
11b,20MHz@8% PER	- 1M @ -94 dBm	≤-83
	- 2M @ -92 dBm	≤-80
	- 5.5M @ -91 dBm	≤-79
	- 11M @ -89 dBm	≤-76
11g,20MHz@10% PER	- 6M @ -89 dBm	≤-85
	- 9M @ -88 dBm	≤-84
	- 12M @ -87 dBm	≤-82
	- 18M @ -84 dBm	≤-80
	- 24M @ -81 dBm	≤-77
	- 36M @ -78 dBm	≤-73
	- 48M @ -73 dBm	≤-69
	- 54M @ -71 dBm	≤-68

11n,20MHz@10% PER	- MCS0 @ -89 dBm	≤-85
	- MCS1 @ -86 dBm	≤-82
	- MCS2 @ -84 dBm	≤-80
	- MCS3 @ -80 dBm	≤-77
	- MCS4 @ -77 dBm	≤-73
	- MCS5 @ -72 dBm	≤-69
	- MCS6 @ -71 dBm	≤-68
	- MCS7 @ -70 dBm	≤-67
11n ,40MHz@10% PER	- MCS0 @ -89 dBm	≤-82
	- MCS1 @ -85 dBm	≤-79
	- MCS2 @ -83 dBm	≤-77
	- MCS3 @ -80 dBm	≤-74
	- MCS4 @ -76 dBm	≤-70
	- MCS5 @ -71 dBm	≤-66
	- MCS6 @ -70 dBm	≤-65
	- MCS7 @ -68 dBm	≤-64
maximum input level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
antenna	GAIN：4 dBi	

2.1 BLE RF Specification

Feature	Description		
General Specification			
BLE Standard	BLE 5.0 of 1Mbps.		
Host Interface	SDIO		
Antenna Reference	External Antenna 4dBi(Provided by the applicant)		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	40 （0~39） channels		
RF Specification			
	Min.	**Typical.**	**Max.**
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-90 dBm	-70 dBm

Maximum Input Level	GFSK (1Mbps): -20dBm

3 Pin Assignments

3.1 Pin Outline

<TOP>
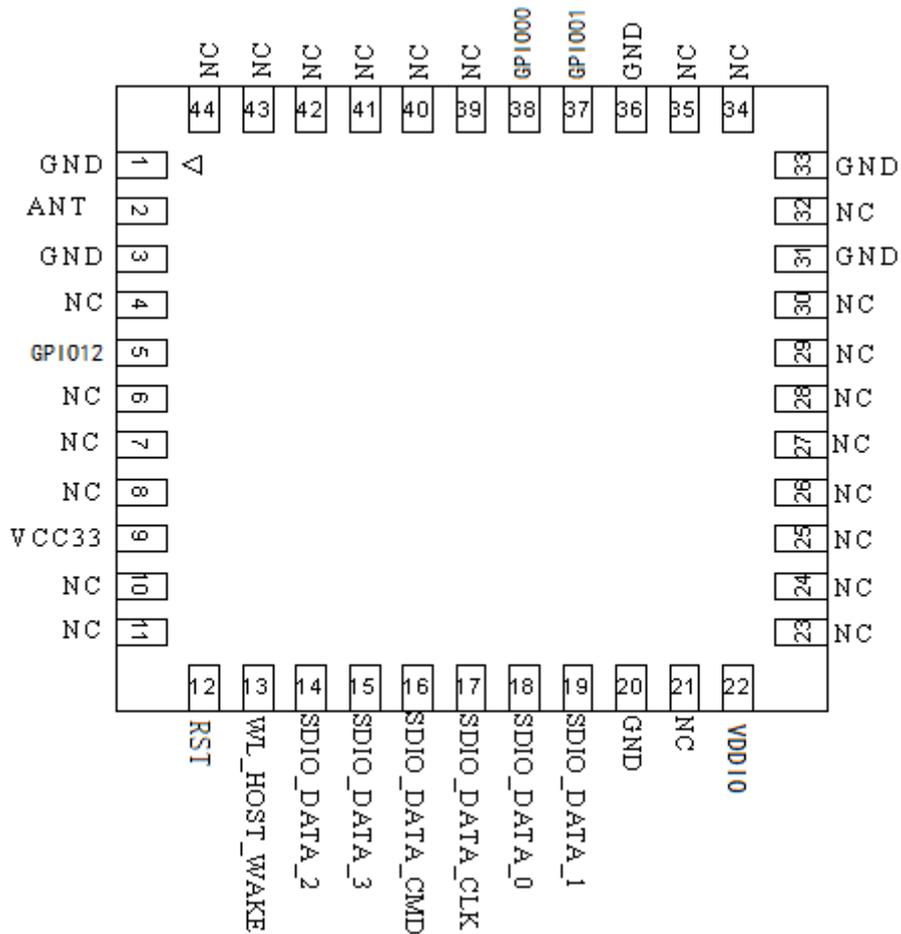
3.2 Pin Definition

Pin #	Name	Description
1	GND	GND
2	ANT	RF OUTPUT
3	GND	GND
4	NC	NC
5	GPIO12	Default low setting to SDIO mode, pull high into SPI mode
6~8	NC	NC

9	VCC33	3.3V IN
10~11	NC	NC
12	RST	Reset, default pull high,active low
13	WL_HOST_WAKE	WLAN WAKE HOST,GPIO14
14	SDIO_DATA_2	SDIO_D2, GPIO17
15	SDIO_DATA_3	SDIO_D3, GPIO18
16	SDIO_DATA_CMD	SDIO_CMD, GPIO19
17	SDIO_DATA_CLK	SDIO_CLK, GPIO20
18	SDIO_DATA_D0	SDIO_D0, GPIO21
19	SDIO_DATA_D1	SDIO_D1, GPIO22
20	GND	GND
21	NC	NC
22	VDIO	1.8 or 3.3V
23~30	NC	NC
31	GND	GND
32	NC	NC
33	GND	GND
34~35	NC	NC
36	GND	GND
37	GPIO01	UART LOG TX
38	GPIO00	UART LOG RX
39~44	NC	NC

P:POWER   I:INPUT   O:OUTPUT

4 Dimensions

4.1 Module Picture

L x W : 12 x 12 mm

12(+0.3/-0.1)

12(+0.3/-0.1)
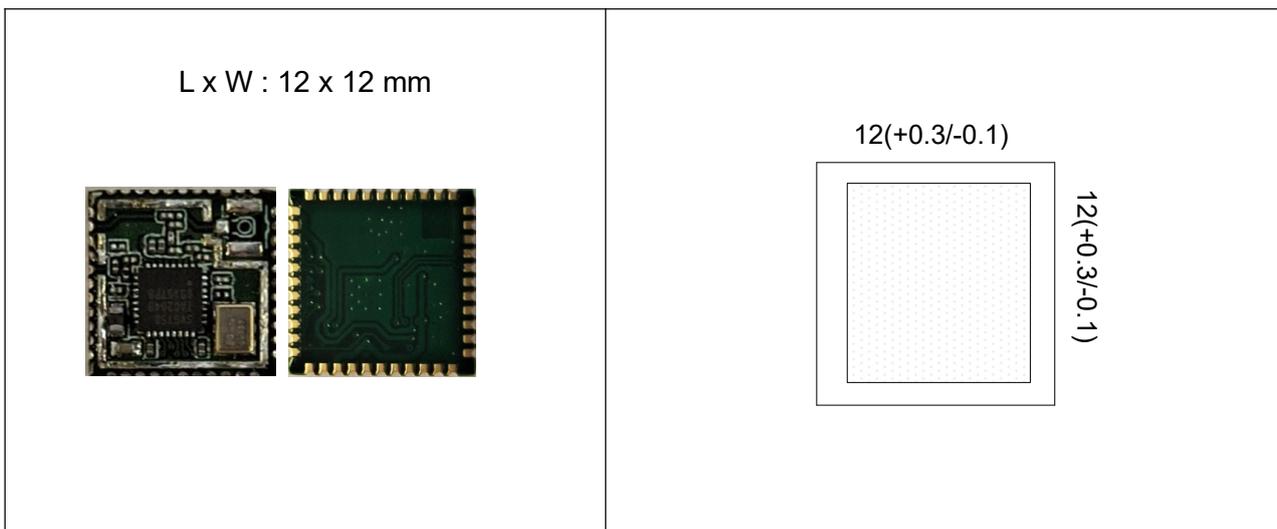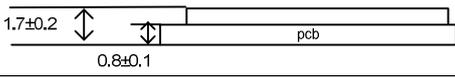
H: 1.7 (±0.2) mm	
Planeness	<0.1mm
Weight	0.40g

(diagram: 1.7±0.2, pcb, 0.8±0.1)

4.2 Marking Description

NA

## 4.3 Module Physical Dimensions
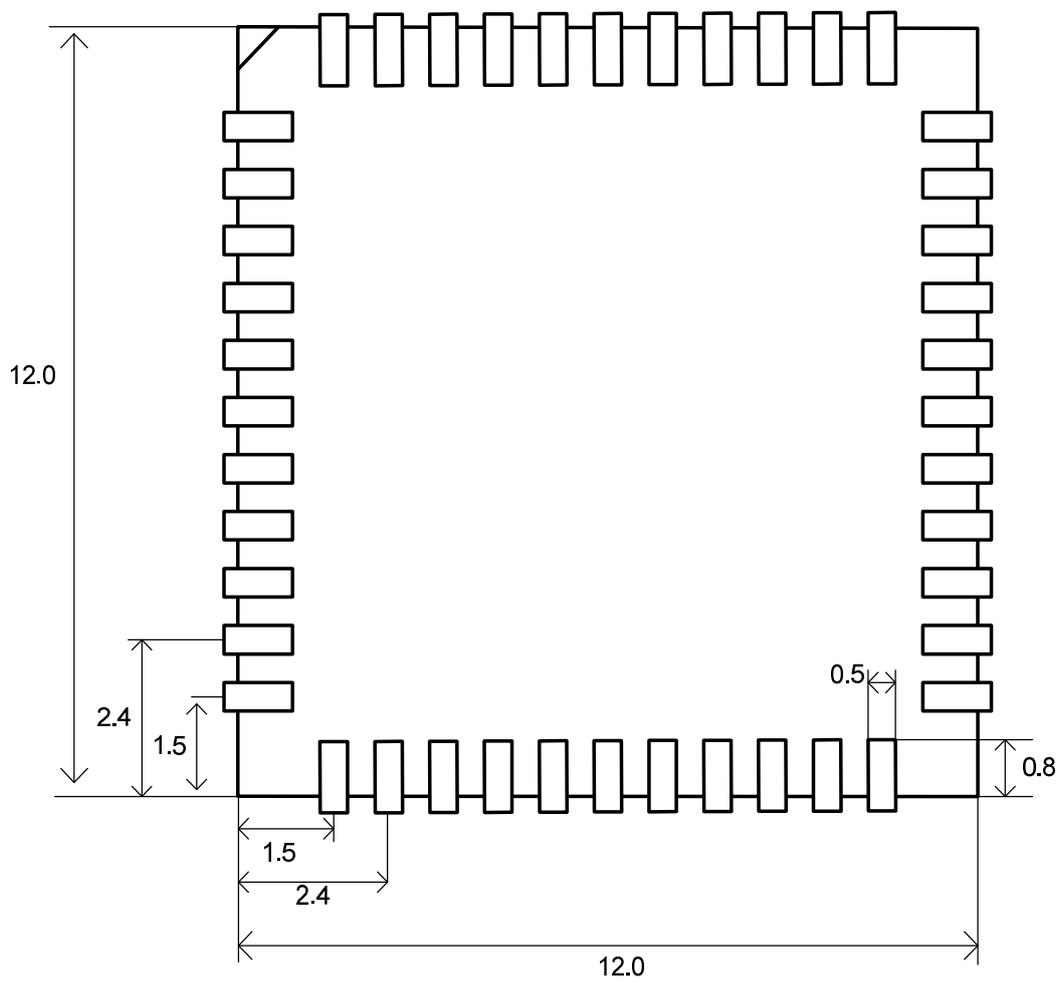
4.4 Layout Reference

(unit: mm)
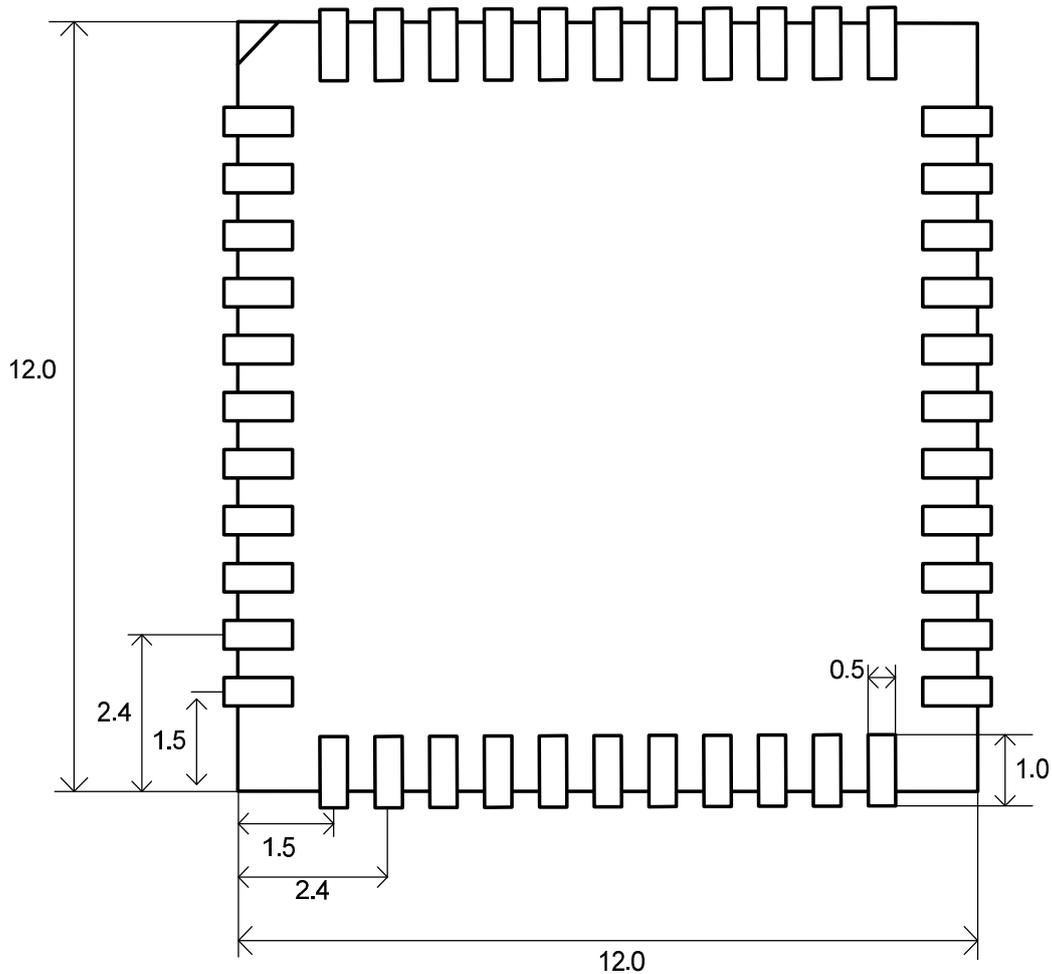
6 Host Interface Timing Diagram

6.1 SDIO Pin Description

The module supports SDIO version 2.0 for all 1.8V 4-bit UHSI speeds: SDR12(25 Mbps), and SDR25(50Mbps) in addition to the 3.3V default speed(25MHz) and high speed (50 MHz).

SDIO Pin Description

SD 4-Bit Mode	
DATA0	Data Line 0
DATA1	Data Line 1 or Interrupt
DATA2	Data Line 2 or Read Wait

DATA3	Data Line 3
CLK	Clock
CMD	Command Line

6.2 SDIO Default Mode Timing Diagram
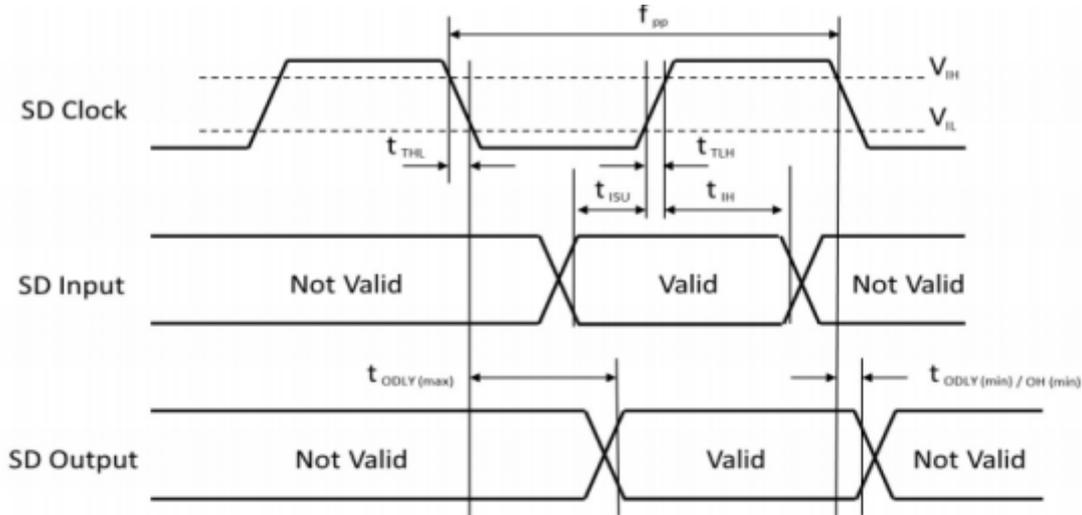
SDIO TIMING WAVEFORM

SDIO version 2.0 Timing Specifications

Symbol	Parameter	Min.	Typ.	Max.	Unit
Clock CLK (All values are referred to min(V_{IH}) and max (V_{IL}).					
f_{pp}	Clock frequency Data Transfer Mode	0		50	MHz
t_{TLH}	Clock rise time			3	ns
t_{THL}	Clock fall time			3	ns
Inputs CMD, DAT (reference to CLK)					
t_{ISU}	Input set-up time	6			ns
t_{IH}	Input hold time	2			ns
Outputs CMD, DAT (reference to CLK)					
t_{ODLY}	Output Delay time during Data Transfer Mode			14	ns
t_{OH}	Output Hold time	2.5			Ns

6.3 SDIO Power-on sequence

Figure 4 shows the power-on sequence of the SV615XP from power-up to firmware download, including the initial device power-on reset evoked by LDO_EN signal. The LDO_EN input level must be kept the same as VDDIO voltage level. After initial power-on, the LDO_EN signal can be held low to turn off the SV615XP or pulsed low to induce a subsequent reset. After LDO_EN is assert and host starts the power-on

sequence of the SV615XP. From that point, the typical SV615XP power-on sequence is shown below:

1. Within 1.3 millisecond, the internal power-on reset (POR) will be done. And host could download firmware code of DPLL setting if the crystal is not default setting, 26MHz. The internal running clock is crystal frequency.

2. After 100us of DPLL settling time, host could set internal clock to full speed and finish all the downloading of firmware code.
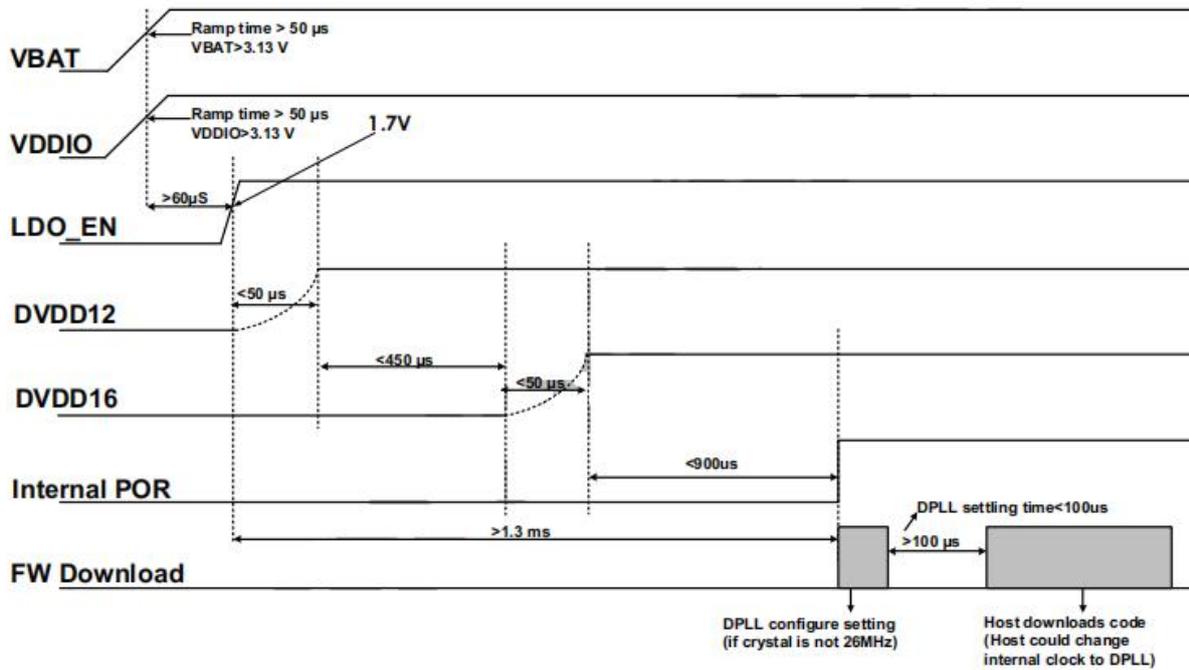

Figure 4 : Power-on sequence
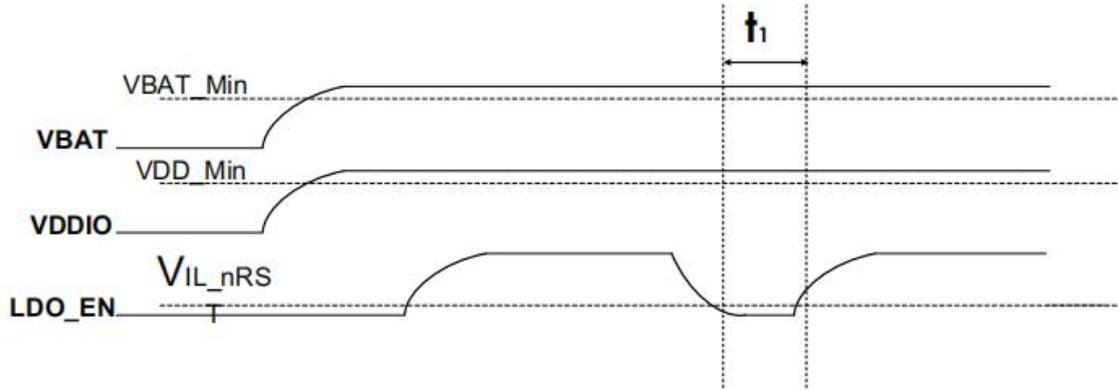
Figure 5 : Reset Timing

Table 2 : Reset Timing Parameters

Parameters	Description	Min.	Unit
t$_1$	Duration of LDO_EN signal level < V$_{IL}$_nRST to reset the chip	30	us

The SV615XP LDO_EN pin can be used to completely reset the entire chip. After this signal has been de-asserted, the SV615XP is in off mode waits for host communication. Until then, the MAC, BB, and SOC blocks are powered off and all modules are held in reset. Once the host has initiated communication, the SV615XP turns on its crystal and later on DPLL. After all clocks are stable and running, the resets to all blocks are automatically de-asserted.

7 Reference Design
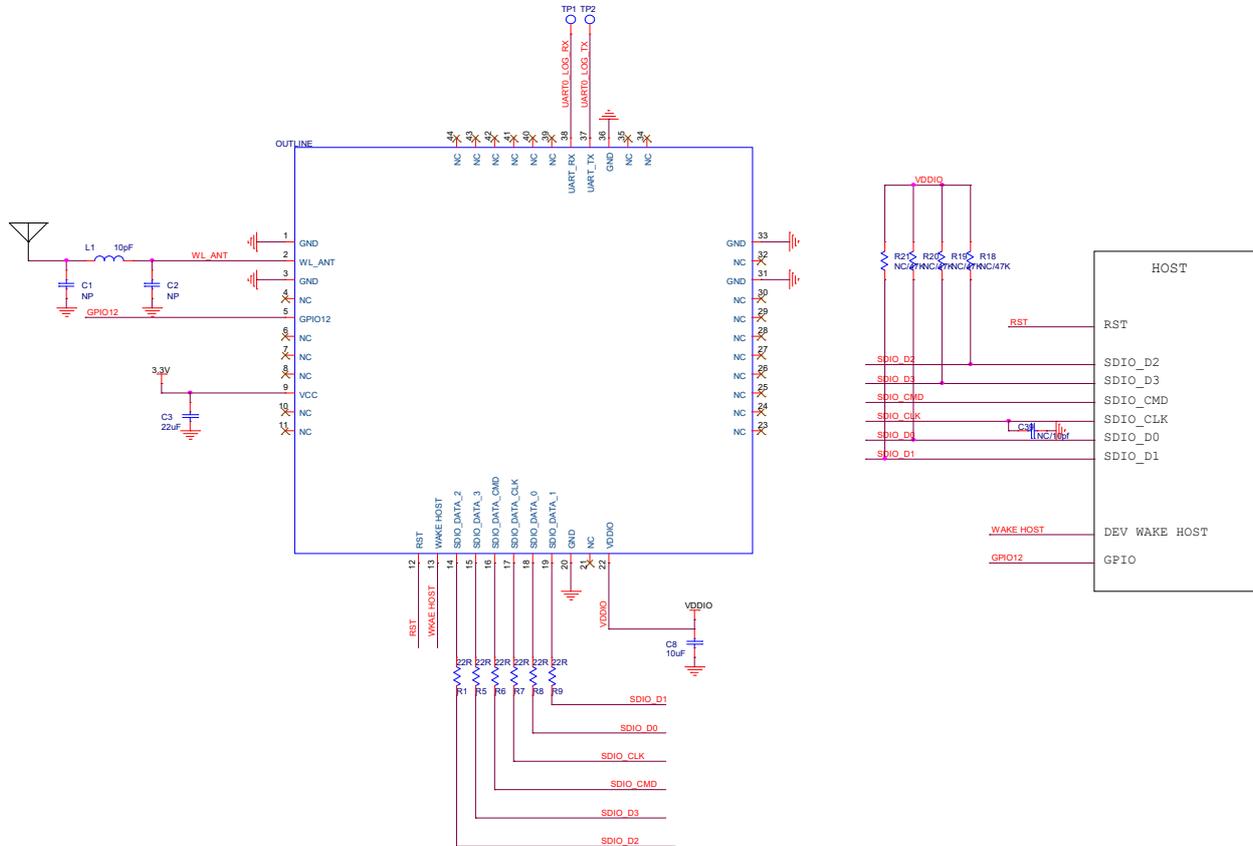
Note:

1. RF trace as short as possible .

8 Ordering Information

Part No.	Description
FGH158ASMX-00	SV6158M,b/g/n,WiFi+BLE5.0, 2.4G,1T1R,SDIO,邮票孔

9 The Key Material List

Crystal	3225 24MHZ CL=12pF,10ppm	ECEC,HOSONIC,TKD,JWT
PCB	H158A-S-V1.0 green, 4L, 12X12X0.8mm	XY-PCB,LX-PCB,SL-PCB,Sunlord

Chipset	SV6158M,11b/g/n/BLE,SDIO,WiFi,4x4mm, QFN32	iCOMMSEMI
Inductor	0603　4.7uH,20%,400mA	Sunlord，cenke，ceaiya

10 Environmental Requirements

10.1 Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times :　≤2 times
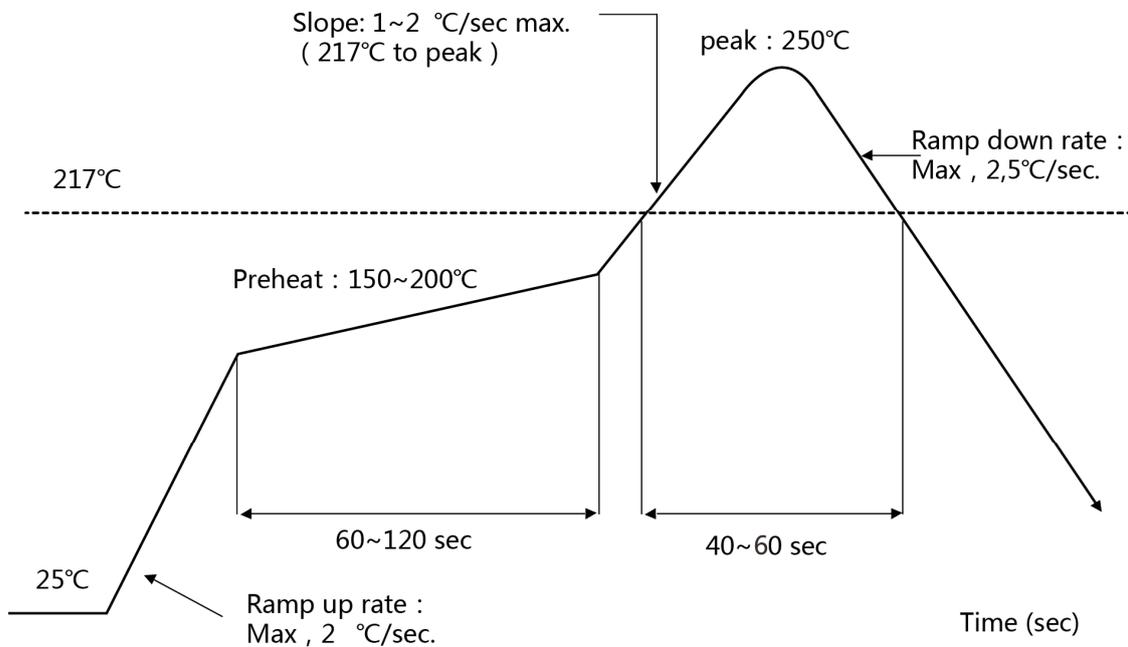
## 10.2 Patch Wi-Fi modules installed before the notice

Wi-Fi module installed note:

1. Please press 1 : 1 and then expand outward proportion to 0.7 mm, 0.12 mm thickness When open a stencil.

2. Take and use the WIFI module, please insure the electrostatic protective measures.

3. Reflow soldering temperature should be according to the customer the main size of the products, such as the temperature set at 250 + 5 ℃ for the MID motherboard.

About the module packaging, storage and use of matters needing attention are as follows:

1. The module of the reel and storage life of vacuum packing: 1). Shelf life: 8 months, storage environment conditions: temperature in: < 40 ℃, relative humidity: < 90% r.h.

2. The module vacuum packing once opened, time limit of the assembly:

Card:1) check the humidity display value should be less than 30% (in blue), such as: 30% ~ 40% (pink), or greater than 40% (red) the module have been moisture absorption.

2.) factory environmental temperature humidity control: ≦ -30 ℃, ≦ 60% r.h..

3). Once opened, the workshop the preservation of life for 168 hours.

3. Once opened, such as when not used up within 168 hours:

1). The module must be again to remove the module moisture absorption.

2). The baking temperature: 125 ℃, 8 hours.

3). After baking, put the right amount of desiccant to seal packages.

11 Package

11.1 Reel

A roll of 1500pcs

| ITEM	W	AO	BO	D	F	E	KO	PO	P2	P	T
DIM	24	12.45	12.45	1.50	11.5	1.75	2.60	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.10	±0.10	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05
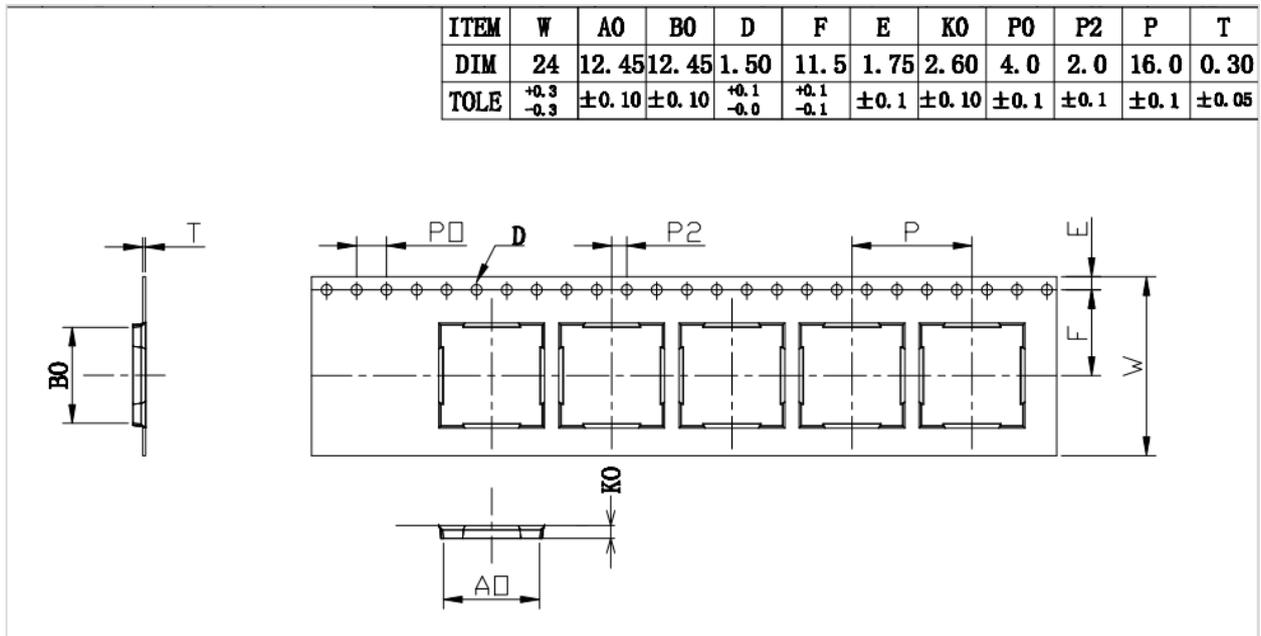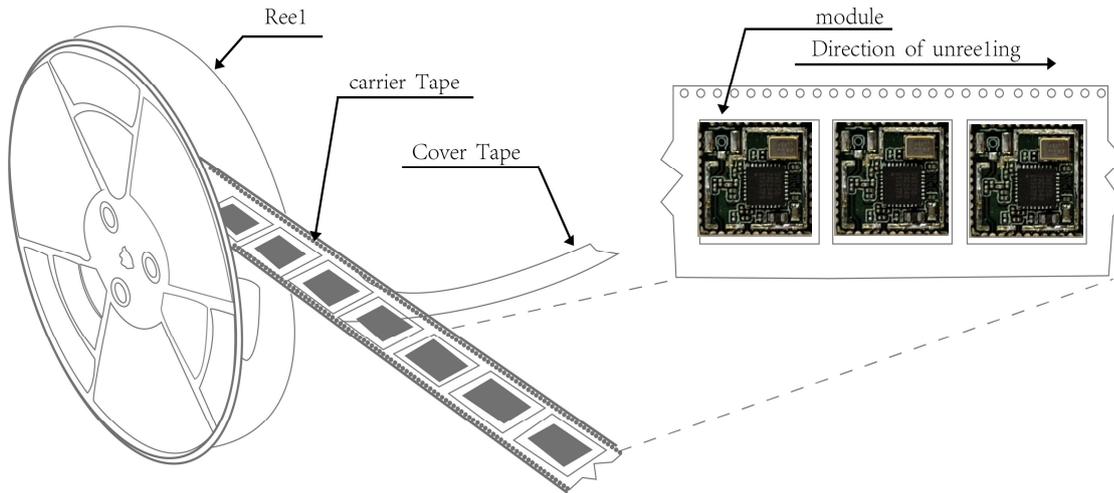
11.2 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape:24mm*32.6m   the cover tape   :21.3mm*32.6m

Color of plastic disc:blue

NY bag size:420mm*450mm   size ：335*335*55mm

The packing case size:335*255*360mm

12.3 Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care

all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH).

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5.

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

b) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected

d) Baking is required if conditions b) or c) are not respected

e) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

1. FCC Statement

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
Integral antenna with antenna gain 4dBi
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection

against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.
We will retain control over the final installation of the modular such that compliance of the end product is assured. In such cases, an operating condition on the limit modular approval for the module must be only approved for use when installed in devices produced by a specific manufacturer. If any hardware modify or RF control software modify will be made by host manufacturer,C2PC or new certificate should be apply to get approval,if those change and modification made by host manufacturer not expressly approved by the party responsible for compliance ,then it is illegal.
FCC Radiation Exposure Statement
This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AATL-H158ASM Or Contains FCC ID: 2AATL-H158ASM"

When the module is installed inside another device, the user manual of the host must contain below warning

statements;
1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including interference that may cause undesired operation.
Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
 However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.
Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission, etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement，then the host can be sold legally.