Progress - NAVIA PN6280 Hardware Design
User Manual
V1.0

RUSSIA

2019

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CONTENT

1. Introduction

PN6280 is a LGA encapsulated HSPA wireless internet access module, which has the advantages of fast Internet access speed, small size, light weight and high reliability. It can be widely used in various products and devices with wireless internet access function.

1.1 Hardware Diagram
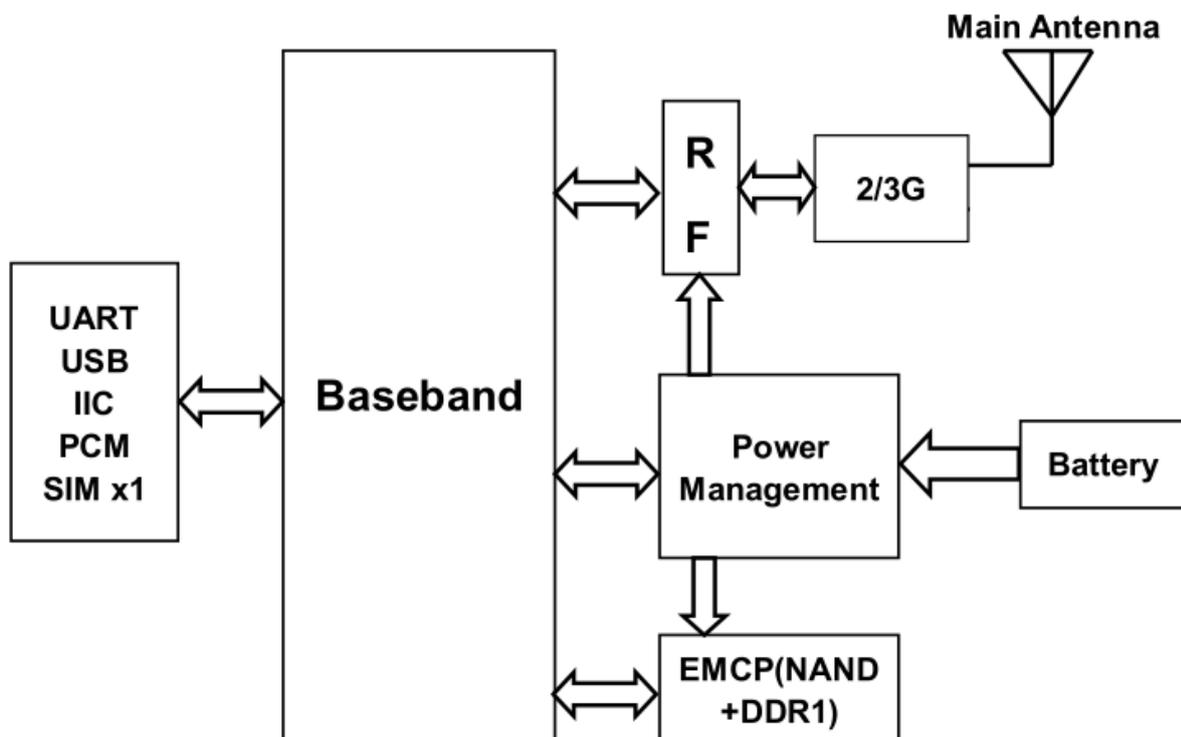
Figure 1-1   PN6280 functional architecture

1.2 Main Features

- **CPU**

  ARM Cortex-R4@481MHz

- **Flash**

  RAM: 512Mb LPDDR1, 200 MHZ

  Flash: 1Gb NAND

- **PN6280 frequency band**

Standard	Frequency
GSM	EGSM900 MHZ
	DCS1800 MHZ
WCDMA	UMTS900 MHZ
	UMTS2100 MHZ

1.3 Specifications

- Supply Voltage Range：3.3～4.2V（type 3.8V）
- Dimensions：29.5mm * 19.5mm * 2.65mm
- Package：90-pin LGA
- Operation Temperature Range：-40℃～+85℃
- Storage Temperature Range：-45℃～+90℃
- Antenna：Main Antenna
- Weight ：Approx 3.5g

1.4 Interfaces

- IIC
- GPIO
- PCM: Digital audio interface
- SIM: Support 1.8V/3V
- UART: High speed UART
- USB 2.0: High Speed ,480Mbps

2. Package Information

2.1 Pin Configuration
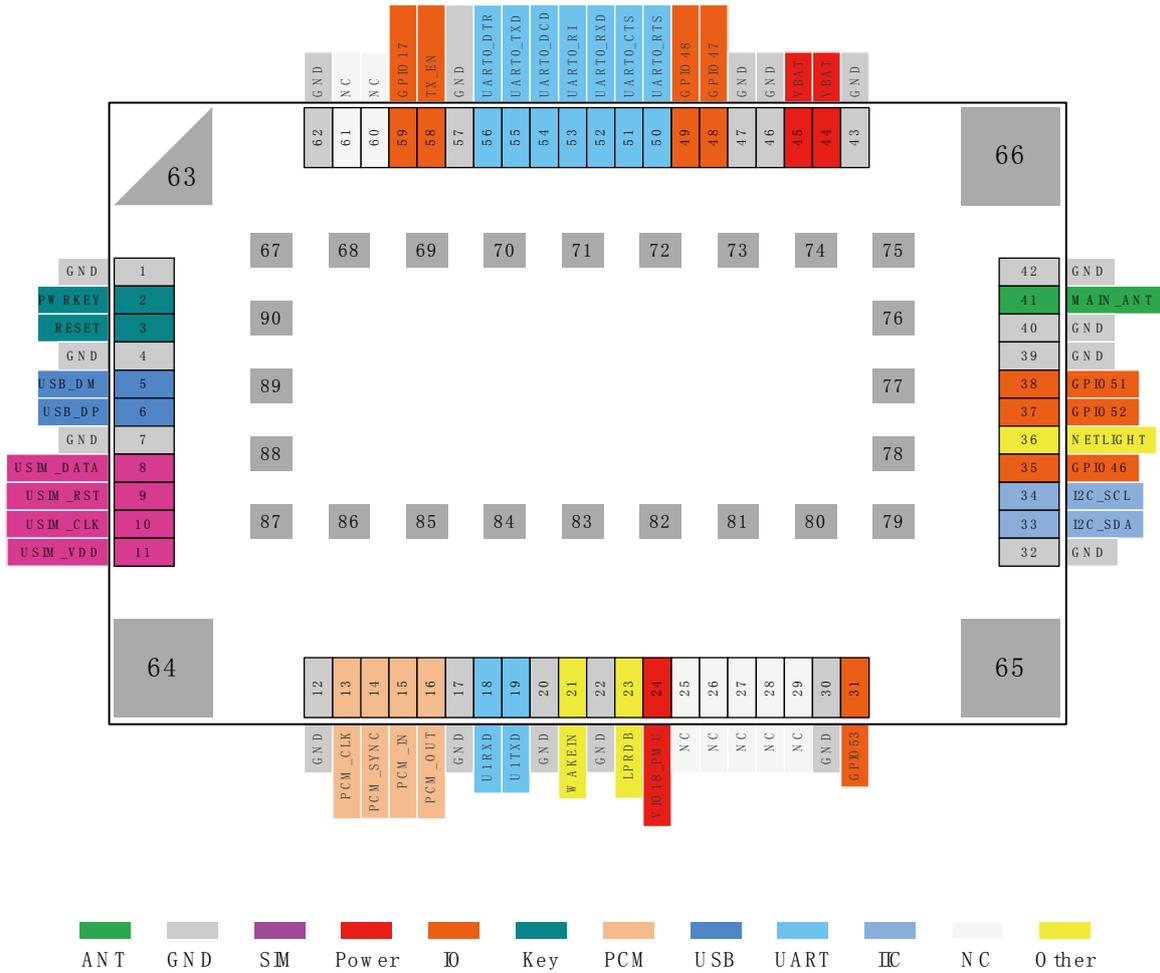
Figure 2-1   PN6280 Pin View

2.2 Pin Definition

Table 2-1　PN6280 Pin description

Pin NO.	Pin name	Type	Function Description	Power domain	State [1]
1.	GND	G	Ground		GND
2.	PWRKEY	I	Powerkey button	0～4.2V	Open
3.	SYSRSTB	I	System reset signal	DVDD18	Open
4.	GND	G	Ground		GND
5.	USB_DM	DIO	USB port differential data line		Open
6.	USB_DP	DIO			Open
7.	GND	G	Ground		GND
8.	USIM_DATA	I/O	USIM data	DVDD18	Open
9.	USIM_RST	O	USIM reset	DVDD18	Open
10.	USIM_CLK	O	USIM clock	DVDD18	Open
11.	USIM_VDD	P	USIM output voltage	1.8/3.0V	Open
12.	GND	G	Ground		GND
13.	PCM_CLK	I/O	PCM interface clock	DVDD18	Open
14.	PCM_SYNC	I/O	PCM interface sync	DVDD18	Open
15.	PCM_IN	I/O	PCM I/F data in	DVDD18	Open
16.	PCM_OUT	I/O	PCM I/F data out	DVDD18	Open
17.	GND	G	Ground		GND
18.	U1RXD	DI	UART1 receive data input	DVDD18	Open
19.	U1TXD	DO	UART1 transmit output	DVDD18	Open
20.	GND	G	Ground		GND
21.	WAKEIN	I/O	Host to set the module into sleep or wake up the module from sleep	DVDD18	Open

22.	GND	G	Ground		GND
23.	LPRDB	I/O	USB download key (Reserve)	DVDD18	Open
24.	VIO18_PMU	P	1.8V output voltage	1.8V	Open
25.	NC		NC		
26.	NC		NC		
27.	NC		NC		
28.	NC		NC		
29.	NC		NC		
30.	GND	G	Ground		GND
31.	GPIO53	I/O	General input/output PIN	DVDD18	Open
32.	GND	G	Ground		GND
33.	I2C_SDA	I/O	General input/output PIN. It can be used as I2C data	DVDD18	Open
34.	I2C_SCL	I/O	General input/output PIN. It can be used as I2C clock	DVDD18	Open
35.	GPIO46	I/O	General input/output PIN	DVDD18	Open
36.	NETLIGHT	O	Output PIN as LED control for network status	DVDD18	Open
37.	GPIO52	I/O	General input/output PIN	DVDD18	Open
38.	GPIO51	I/O	General input/output PIN	DVDD18	Open
39.	GND	G	Ground		GND
40.	GND	G	Ground		GND
41.	MAIN_ANT	ANT	Main antenna		Open
42.	GND	G	Ground		GND
43.	GND	G	Ground		GND
44.	VBAT	P	Power supply	3.3～4.2V	VBAT
45.	VBAT				VBAT
46.	GND	G	Ground		GND

47.	GND	G	Ground		GND
48.	GPIO47	I/O	General input/output PIN	DVDD18	Open
49.	GPIO48	I/O	General input/output PIN	DVDD18	Open
50.	UART0_RTS	DI	UART0 ready to receive	DVDD18	Open
51.	UART0_CTS	DO	UART0 clear to send	DVDD18	Open
52.	UART0_RXD	DI	UART0 receive data input	DVDD18	Open
53.	UART0_RI	DO	UART0 ring indicator	DVDD18	Open
54.	UART0_DCD	DO	UART0 data carrier detect	DVDD18	Open
55.	UART0_TXD	DO	UART0 transmit output	DVDD18	Open
56.	UART0_DTR	DI	UART0 Data terminal ready	DVDD18	Open
57.	GND	G	Ground		GND
58.	TX_EN	DO	TX Enable signal	DVDD18	Open
59.	GPIO17	I/O	General input/output PIN	DVDD18	Open
60.	NC		NC		
61.	NC		NC		
62.	GND	G	Ground		GND
63.	GND	G	Ground		GND
64.	GND	G	Ground		GND
65.	GND	G	Ground		GND
66.	GND	G	Ground		GND
67.	GND	G	Ground		GND
68.	GND	G	Ground		GND
69.	GND	G	Ground		GND
70.	GND	G	Ground		GND
71.	GND	G	Ground		GND
72.	GND	G	Ground		GND

73.	GND	G	Ground		GND
74.	GND	G	Ground		GND
75.	GND	G	Ground		GND
76.	GND	G	Ground		GND
77.	GND	G	Ground		GND
78.	GND	G	Ground		GND
79.	GND	G	Ground		GND
80.	GND	G	Ground		GND
81.	GND	G	Ground		GND
82.	GND	G	Ground		GND
83.	GND	G	Ground		GND
84.	GND	G	Ground		GND
85.	GND	G	Ground		GND
86.	GND	G	Ground		GND
87.	GND	G	Ground		GND
88.	GND	G	Ground		GND
89.	GND	G	Ground		GND
90.	GND	G	Ground		GND

(1) Suggested status when not in use.

Notes：All IO ports module provides need to be out of floating in the boot process. If the IO is pulled up by the external voltage before booting, it may cause the module not to start normally.

Table 2-2   Pin type description

P:POWER	G:GROUND
I:INPUT	DI:DIGITAL INPUT
O:OUTPUT	DO:DIGITAL OUTPUT
ANT:ANTENNA	DIO:DIGITAL INPUT OUTPUT
NC:NOT CONNECT	

2.3 Package Information

2.3.1 Dimensions

The PN6280 mechanical dimensions are described as following figure (Top view, Back view, Side view).
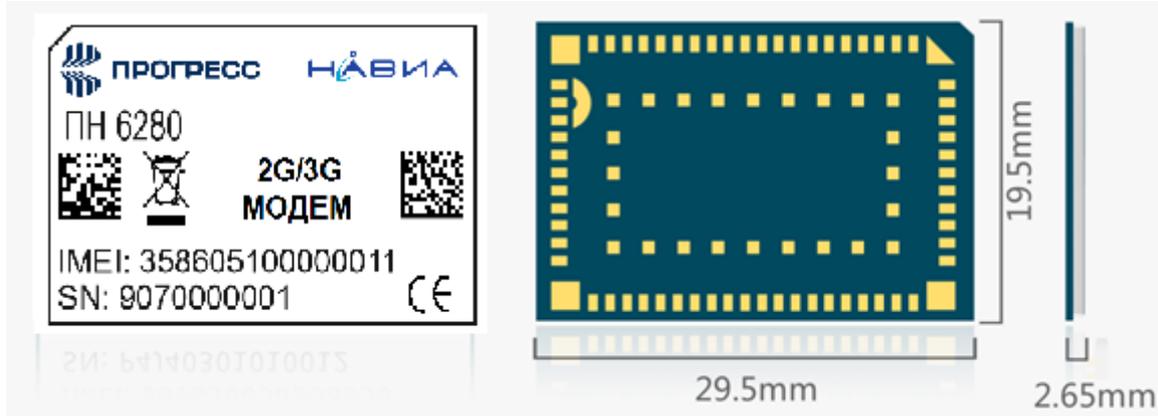
Figure 2-2   Mechanical Dimensions

2.3.2 Product labeling

Figure 2-3   Label of PN6280

Table 2-3   Description of label

Item	Description
A	Pin1 mark
B	Logo of companies
C	Module name (model)
D	QR code---include IMEI number
E	WEEE
F	IMEI number
G	SN number
H	Module description (2G/3G module)
I	QR code---include SN number
J	CE certification mark

2.3.3 Module size

Figure 2-4   Module Size (Unit: mm)

2.3.4 Recommend decal

Figure 2-5   Recommend pad (front view, unti: mm)

3. Interface Circuit Design

3.1 Power Section

3.1.1 Power supply

VBAT is the main power supply of the module, and the input voltage range is 3.3V to 4.2V. The recommended voltage is 3.8V. Because the module transmit burst may cause voltage drops, the highest peak will reach 2A. A large capacitor voltage is recommended to use near VBAT pins, and the capacitor's value is the bigger the better. In order to improve the continued flow of large current, it is recommended to use a low-impedance tantalum 470uF or larger. During layout, the capacitors are close to the VBAT pins.
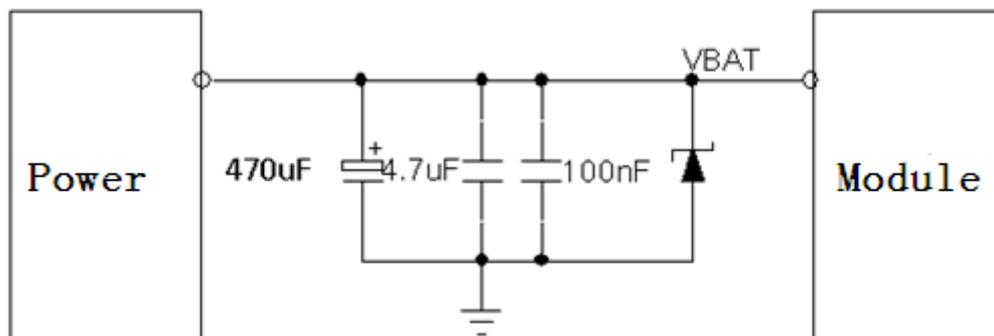
Figure 3-1   Power Supply circuit

Notes: According to the environment, please select capacitor as large value as possible; and add 100pF, 33pF capacitors if requiring.

Add Zener close to our module. The Zener should be 5.1V/500mW, Ir<100uA @Vr=4.2V. Ta=25℃.

3.1.2 Power pin description

Pin number	Pin name	Description
44/45	VBAT	positive signal
1/4/7/12/17/20/22/30/32/39/40/42/43/46/47/57/62	GND	GND
63~90	GND	GND

The Ground of power and signal need to be GND. Ground signal connection is not complete will have an impact on the performance of the product. In addition, there are a total of 28 (63~90) heat sink and fixed ground pad.

3.1.3 Hardware power on/off

Module second pin is the Power on/off key. Pulling down the PWRKEY continuously, the module will boot. Releasing the PWRKEY, the module will shutdown. There is internally pulled-up resistor. If using the power on the boot form, and the PWRKEY is grounded directly. If you do not need to power on the boot, you can control the PWRKEY to achieve. Typical circuit is shown in figure 3-2.
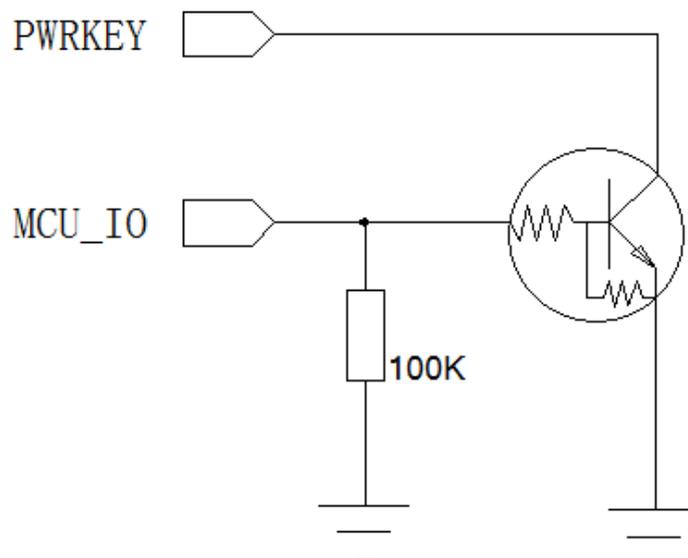

Figure 3-2   Control module boot circuit

3.1.4 Hardware reset

Module third pin is the hardware reset input. The module will power off when it receives a 20ms low level signal. The system has an internal pull up, the typical value is 1.8V, and do not need to pull up externally.
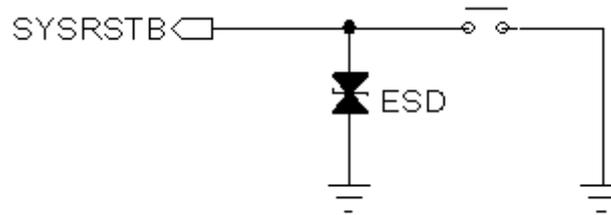
Figure 3-3　System Reset

3.2 USIM Interface

3.2.1 Pin description

PN6280 supports and be able to automatically detect 3.0V and 1.8V USIM card. USIM card interface signal as shown in table 3-1.

Table 3-1　(U)SIM Pin Description

Pin NO.	Pin Name	Signal definition	Function Description
8	USIM_DATA	USIM card data pin	USIM card DATA signal, I/O signal
9	USIM_RST	USIM card reset pin	USIM card reset signal, output by the module
10	USIM_CLK	USIM card clock pin	USIM card clock signal, output by the module
11	USIM_VDD	USIM output voltage	USIM card power supply, output by the module

3.2.2 USIM application

USIM card signal group (PIN number: 8, 9, 10, 11), near the USIM card seat on the line. Please note to increase the ESD protection device.

In order to meet the requirements of 3GPP TS 51.010-1 protocol and EMC certification, the proposed USIM card is arranged near the position module USIM card interface, and avoid to layout too long resulting in serious waveform distortion, affecting the signal integrity. USIM_CLK and USIM_DATA signals are recommended to be protected. Between GND and USIM_VDD in parallel with a 1uF and 33pF capacitors, that can filter out the interference of radio frequency signals.
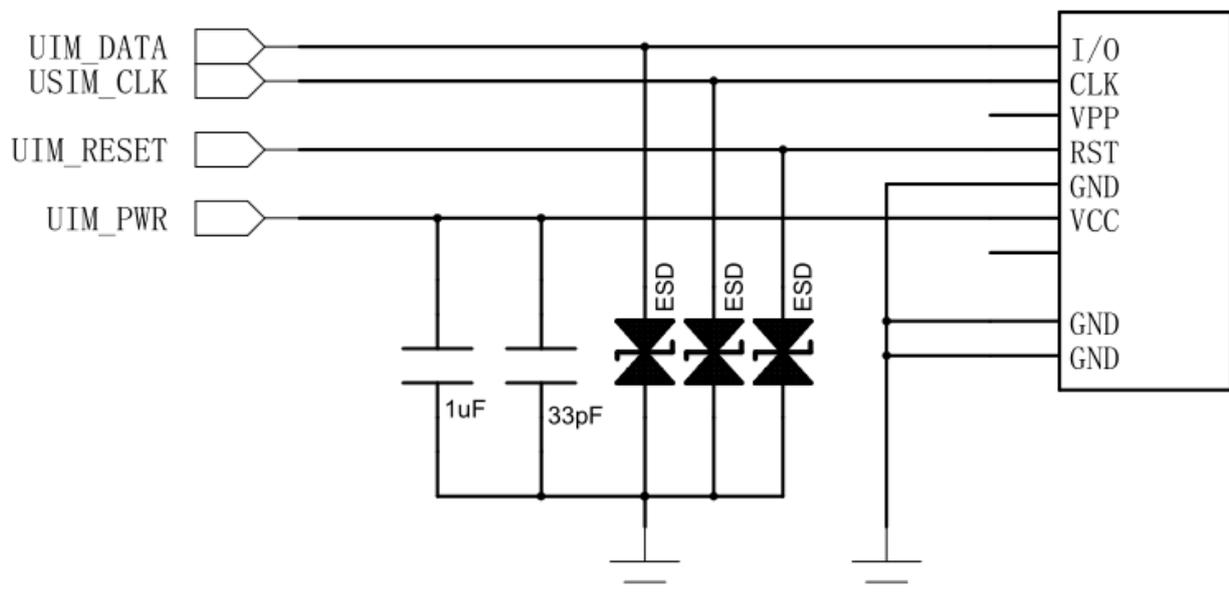

Figure 3-4   (U)SIM Circuit

3.3 USB Interface

USB application

The USB interface of the module conforms to the USB2.0 specification and electrical characteristics. Support the low-speed, full-speed and high-speed three operating modes. The data exchange between the main processor (AP) and the module is mainly completed through the USB interface.

USB bus is mainly used for data transmission, software upgrade, module program testing. Working in the USB mode of the high-speed line, if you need ESD design, ESD protection devices must meet the junction capacitance value of less than 3pF, otherwise the larger junction capacitance will cause waveform distortion, and affect the bus communication. The differential impedance of differential data lines should be controlled at 90ohm ±10%, and lines should be protected up and down, and can't be crossed with other lines. USB connection circuit is as follows.

Figure 3-6   USB Circuit
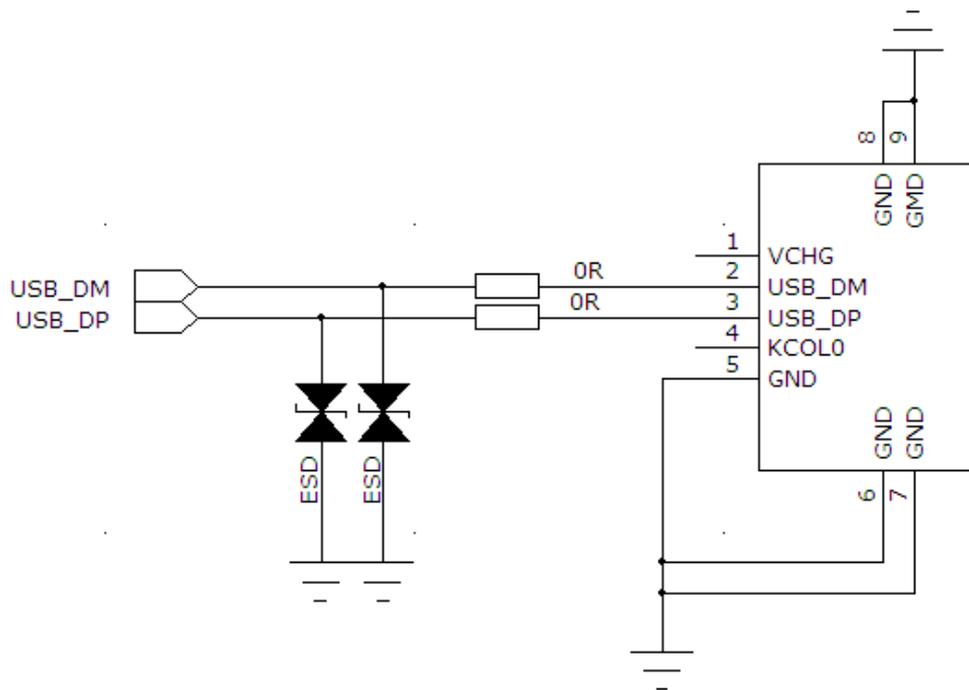
Note: If you use the serial port communication, the DM/DP reserved test points respectively in order to download software. If DM/DP is used to communicate with the MCU, the position of the DM / DP signal near the module needs to reserve a test point and the DM/DP requires a series 0R resistor. The resistor is placed near the module and the test point is placed between module and resistor.

3.4 PCM Interface

PCM application

PN6280 provides a digital audio interface (PCM) that can be used as a PCM master device to transmit digital voice signals. PN6280 only acts as a master device. PCM sync, PCM CLK are as output pins and PCM sync output 16kHz synchronization signals, the PCM data support 8-bit or 16 bit data format. We recommended codec chip is NAU8814YG. The codec chip crystal default use 1.8V power supply, 12M output active crystal. The power control pin of the PCM uses the PIN35 by default. And NAU8814YG connected circuit from the device is shown in figure 3-7.
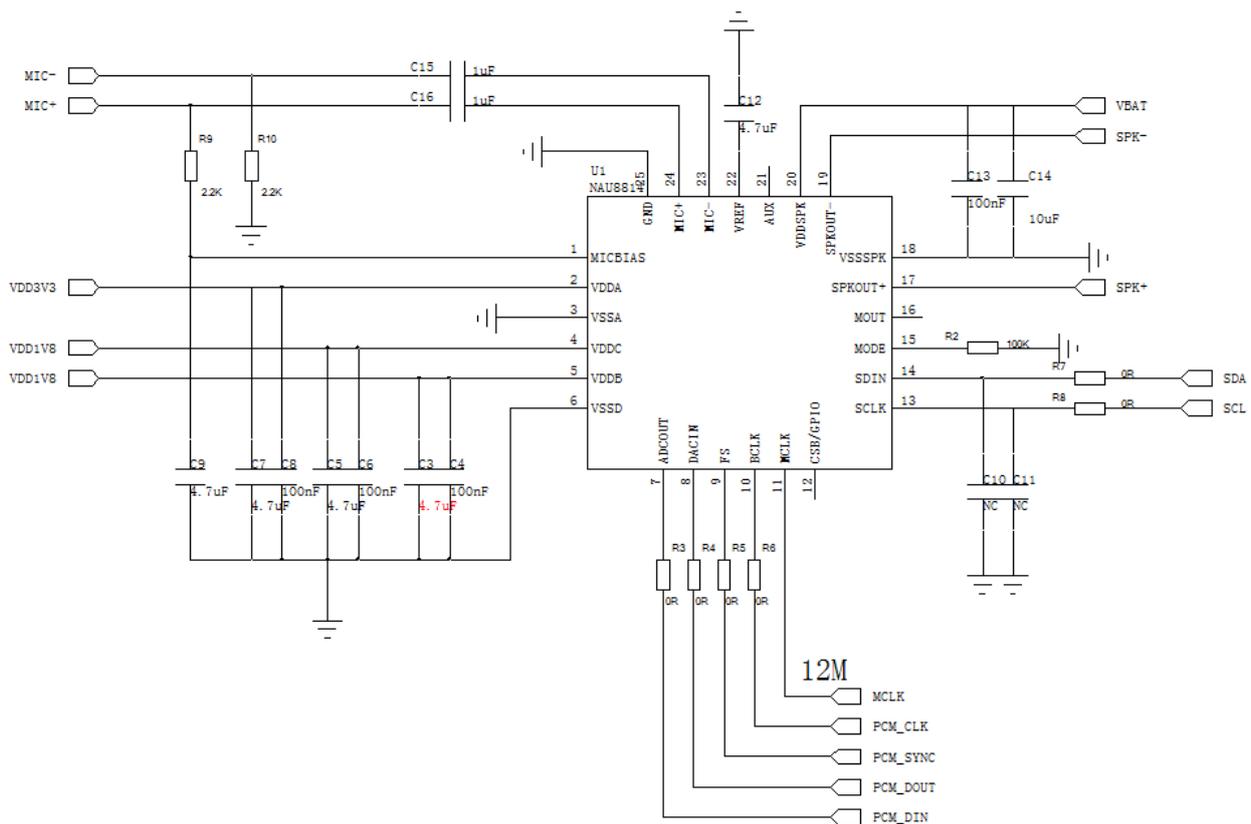

Figure 3-7　NAU8814YG peripheral Circuit（PN6280 as Main device）

3.5 IIC Interface

PN6280 module does not have a dedicated IIC interface. If you need to use the IIC interface for communication, you should use the GPIO port to simulate the IIC interface, and it is recommended to use an external pull-up resistor of 4.7K by VIO18.

3.6 UART Interface

3.6.1 Pin description

The module PN6280 provides two UART serial communication interfaces:

the UART1 is as the end of the AP module debug port, 2-wire UART interface;

UART0 can be debug port and also can be as complete non-synchronous communication interface, supporting standard modem handshake signal control and in compliance with the RS-232 interface protocol, also supporting 4-wire serial bus interface or 2-wire serial bus interface mode. The module can communicate AT commands by UART interfaces.

The two groups of UART ports support programmable data width, stop bits, and parity bits, with separate TX and Rx FIFOs (512 bytes each). The max baud rate of normal application of UART (non-Bluetooth) is 115200bps. The default baud rate is 115200bps.

Table 3-2   UART Pin Description

Pin NO.	Pin Name	I/O	Function Description
18	URXD1	DI	UART1 receive data input only for debugging
19	UTXD1	DO	UART1 transmit output only for debugging
50	UART0_RTS	DI	UART0 Ready to receive
51	UART0_CTS	DO	UART0 Clear to Send

52	UART0_RXD	DI	UART0 receive data input
53	UART0_RI	DO	UART0 Ring Indicator. It can be used as wake out signal to host from module
54	UART0_DCD	DO	UART0 Data Carrier Detect
55	UART0_TXD	DO	UART0 transmit data output
56	UART0_DTR	DI	Data Terminal Ready(wake up module)

3.6.2 UART application

UART1 can be used for software debugging process. We suggest that the users retain this interface and set aside the test point.

If used in communication between the module and application processor, and the level is 1.8V, the connection mode is shown in Figure 3-8 and figure 3-9. You can use the complete RS232 mode, 4 wires or 2 wires mode connection. Module interface level is 1.8V. If the AP interface level does not match, you must increase the level conversion circuit.
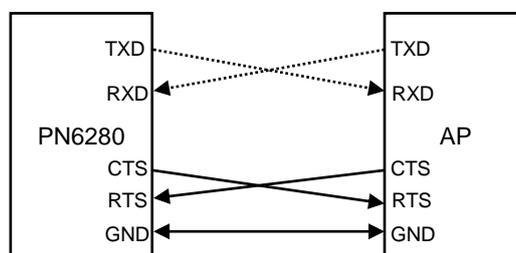

Figure 3-8   Connect to AP method(4lines)
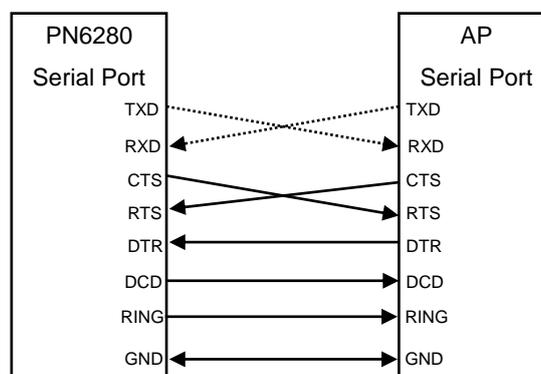
Figure 3-9 Connect to AP method

Notes：

Serial communication, the module can enter the sleep;

USB communication, the module can't enter the sleep, unplug the USB, the module can enter the sleep.

3.7 Interactive Application Interface

Pin Description

Table 3-3 Interactive application interface

Pin NO.	Pin name	I/O	Function Description
21	WAKEIN	I/O	General Purpose input/output Port. It can be used as wake up/interrupt signal to module from host. L: wake up module, H: module into sleep. If it is unused, left open
36	NETLIGHT	O	Output PIN as LED control for network status. If it is unused, left open

Note：If need to use more GPIO ports, you can refer to table 2-1; User can read and write GPIO port state through the AT command.

3.8 LED Interface

3.8.1 LED control circuit

NETLIGHT/GPIO54 (PIN36) can be used to control the network status of the lam.
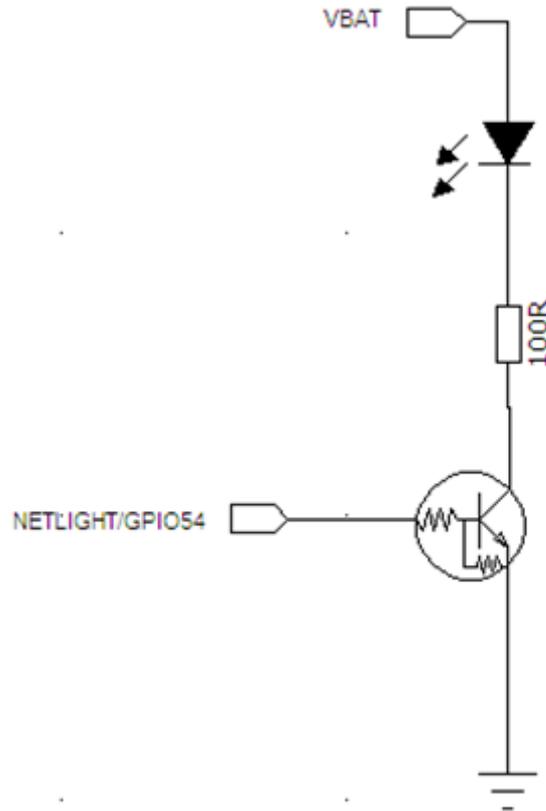
Figure 3-10   LED Circuit

3.8.2 LED state description

NETLIGHT/GPIO54 is used as the enable pin. Table 3-4 lists the LED status.

Table 3-4   LED Status

LED Status	Module Status
Always On	Searching Network/Call Connect

300ms ON, 300ms OFF	Data Transmit
800ms ON, 800ms OFF	Registered network
OFF	Power off / Sleep

4. Electrical Characteristics

4.1 Electrical Characteristics

Table 4-1　Electrical characteristics

Power	Min.	Nom.	Max	Unit
VBAT	3.3	3.8	4.2	V
Peak current	-0.3	-	2.0	A

Notes: The over-low voltage can't power on the module; Over-high voltage may be danger to damage the module.

Using the DCDC supply, please ensure the ability of DCDC over 2.0A. We don't suggest the LDO as the power supplier.

4.2 Temperature Characteristic

Table 4-2　Temperature characteristic

State	Min.	Nom.	Max	Unit
Working	-40	+25	+85	℃
Storage	-45	+25	+90	℃

Note: When the temperature is over the range, the RF performance may be dropped. It also may cause power down or restart problem.

4.3 Absolute Maximum Power

Table 4-3　Absolute maximum power rating

PIN Name	Description	Min.	Typ.	Max.	Unit
DVDD18	Digital power input for IO	1.7	1.8	1.9	V

4.4 Recommended Operating Conditions

Table 4-4　Recommended operating range

PIN Name	Description	Min.	Typ.	Max.	Unit
DVDD18	Digital power input for IO	1.7	1.8	1.9	V

Note: All the GPIOs of module are 1.8V.

4.5 Power Consumption

Table 4-5　Power Consumption

Parameter	Conditions	Min.	Average	Max.	Unit
Standby current	Flight mode Suspend state	-	1.0		mA

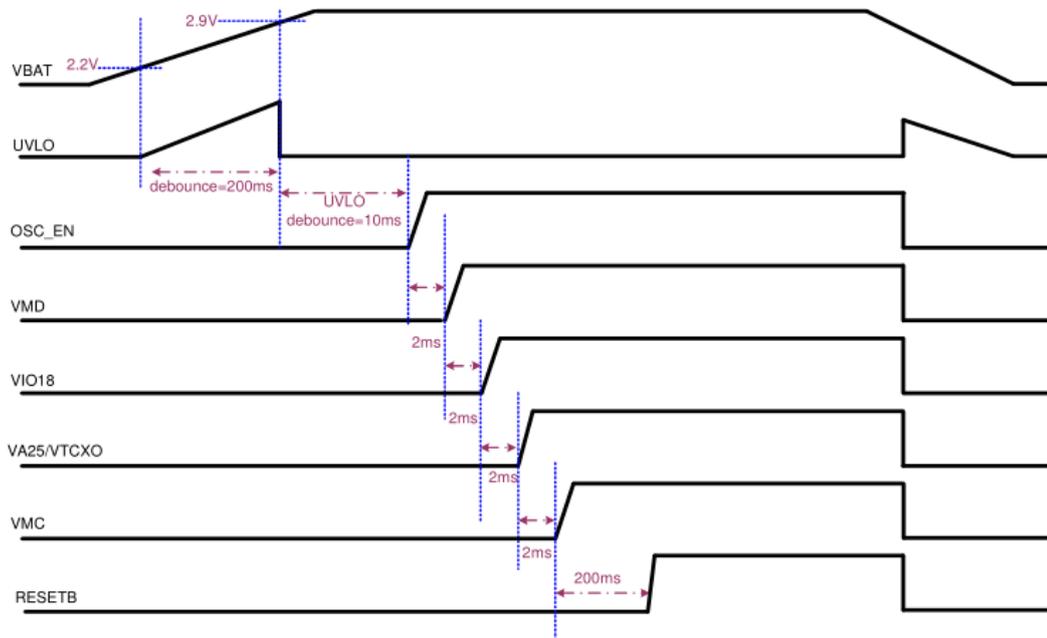|	2G only	-	1.8		mA
	WCDMA only	-	1.9		mA
	USB+Fltght mode	-	21.8		mA
	GSM900,MAX Power	-	232		mA
	DCS1800，MAX Power	-	172		mA
	WCDMA@CH3012,MAX Power	-	482		mA
	WCDMA@CH10700,MAX Power	-	452		mA
Peak current	Max power mode burst current		-	2.0	A

4.6 Power Sequence

Figure 4-1　Power up time sequence diagram

4.7 Digital Interface Characteristics

Table 4-6   Digital IO Voltage

Parameter	Description	Min.	Typical	Max.	Unit
VIH	High level input voltage	1.62	1.8	1.98	V
VIL	Low level input voltage	0	-	0.7	V
VOH	High level output voltage	1.62	1.8	1.98	V
VOL	Low level output voltage	0	-	0.3	V

Note: Suit to all GPIO, IIC, UART interfaces.

4.8 ESD

The module contains high sensitive electronic and is an electrostatic Sensitive Device. More attentions should be paid to the procedure of handing and packaging. The ESD test results are shown in the following table.

ESD parameter（Tem：25℃，humidity：45%）.

Table 4-7   ESD Performance

PIN Name	Contact discharge	Air discharge
VBAT	±4KV	±8KV

GND	±4KV	±8KV
RF_ANT	±4KV	±8KV

Enhanced ESD performance method:

1、 If the customer to the adapter plate, the adapter plate anchor as much as possible, and the uniform distribution of conduction path width；

2、 Key (reset key) need to add ESD device; reset key to walk the line do not rely on the edge of the board；

3、 USB, UART and other plug connection need to add ESD devices, the other from the outside of the machine out of the control line also need to add ESD devices;

4、 SIM card, users will get inserted t-card touch the place also need to add ESD device；

5、 External antenna, please add ESD device, ESD $C_{pf}<0.5pF$.

Notes: For ESD protect, please add ESD methods according to upper ways.

High speed circuits like USB, TF and SIM card should be added ESD with low capacity value.

ESD components include varistors and TVS. For better performance, please use TVS.

5. RF Features

5.1 Frequency Band

PN6280 supports E-GSM900/DCS1800 and UMTS2100/UMTS900.

Table 5-1 Frequency Band

Frequency	Uplink	Downlink
E-GSM900	880 MHz — 915 MHz	925 MHz — 960 MHz
DCS1800	1710 MHz — 1785 MHz	1805 MHz — 1880 MHz
UMTS2100	1920 MHz — 1980 MHz	2110 MHz — 2170 MHz
UMTS900	880 MHz — 915 MHz	925 MHz — 960 MHz

Table 5-2 Output Power

Frequency	Max output power	Min output power
E-GSM900	33dBm ±2dB	5dBm ±5dB
DCS1800	30dBm ±2dB	0dBm ±5dB
E-GSM900(8-PSK)	27dBm ±3dB	5dBm ±5dB
DCS1800(8-PSK)	26dBm +3/-4dB	0dBm ±5dB
UMTS2100	24dBm +1/-3dB	-56dBm ±5dB
UMTS900	24dBm +1/-3dB	-56dBm ±5dB

Table 5-3 Receive Sensitivity

Frequency	Receive sensitivity

E-GSM900	<-109dBm
DCS1800	<-109dBm
UMTS2100	<-109dBm
UMTS900	<-109dBm

5.2 Data Link

PN6280 supports GPRS/EDGE CLASS 12and HSDPA/HSDPA R8. The actual application depends on the local network operator.

Table 5-4 Data Link

Version	Function	Max supported	Theoretical max peak rate
PN6280	GPRS	CS4	85.6kbps
PN6280	EDGE	MCS9	236.8kbps
PN6280	HSDPA	Cat10	14.4Mbps
PN6280	HSUPA	Cat6	5.76Mbps

5.3 Antenna Design

The access part of the RF antenna of this product supports the PAD form. The connection between the module and the main board antenna interface is required to be welded and connected through a microstrip line or a strip line. The microstrip line or strip line is designed according to the characteristic impedance of 50 ohm, and the length of the wire is less than 10mm. Reserved П matching network

Antenna efficiency

Antenna efficiency is the ratio of the input power and radiant power. Because of the return loss, material loss and coupling loss of the antenna, the radiant power is always lower than the input power. The ratio is recommended to be controlled over 40%(-4dB).

S11 or VSWR

S11 indicates the matching level of the 50 Ohm impedance for the antenna. It affects the antenna efficiency in a certain extent. The VSWR testing method could be used for measuring purpose. The recommended value for S11 is less than -10dB.

Polarization

Polarization refers to the rotation direction of electric field while the antenna is in the direction of maximum radiation. Linear polarization is recommended. It is recommended to use the diversity antenna which has the different polarization direction from the main antenna.

Radiation pattern

The radiation pattern refers to the intensity of the electromagnetic field while the antenna is in every direction of the far field. Dipole antenna is perfect as the terminal antenna. For built-in antenna, it is recommended to use PIFA or IFA antennas.

Antenna dimension: 6mm*10mm*100mm (H*W*L).
Antenna radiation direction: omnidirectional.

Gain and directivity

Antenna directivity refers to the intensity of the electromagnetic field while the electromagnetic wave is in all directions. Gain is the collection of the efficiency and directivity of the antenna. It is recommended that antenna gain is less than or equal to 3dBi.

Interference

In addition to antenna performance, some other interference from the PCB will also affect the module performance. To ensure the high performance of the module, the interference must be under control. Suggestions: keep speaker, LCD, CPU, FPC wire routing, audio circuits, and power supply away from the antenna, and add appropriate filtering and shielding protection, or adding filtering devices on the traces.

TRP/TIS

TRP(Total Radiated Power):
    GSM900 >28dBm
    GSM1800 >25dBm
    WCDMA Band1/8 >19dBm
TIS(Total Isotropic Sensitivity):
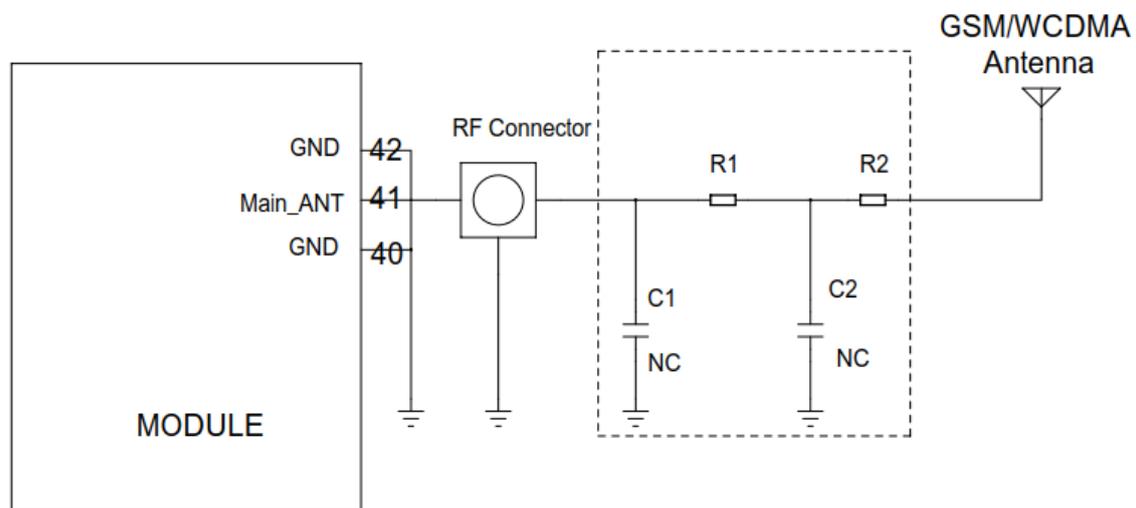   GSM900/1800 <-105dBm
    WCDMA Band1/8 <-105dBm

Figure 5-1   Main   Antenna Design

Figure R1, C1, C2 and R2 composition of the antenna matching network for antenna debugging, the default R1, R2 paste 0 ohm resistor C2, C1 empty paste, to be antenna factory after the antenna to determine the value of the antenna；The RF Connector in the figure is reserved for test conduction test (e.g. certified CE, FCC, etc.) and should be placed as close as possible to the module. The RF path from the module pad to the antenna feed point should be controlled by 50 ohms impedance Storage and Production.

6. Storage and Production

6.1 Storage

The rank of moisture proof of the module is level 3. There is an obvious sign on the table of the internal and the external packaging.

In the vacuum sealed bag, the module can be stored for 180 days when the temperature is below 40°C and the humidity is below 90% under good air circulation.

Humidity level is described detail as follows:

Table 6-1   Humidity level

Rank	Factory Environment ≦ +30°C /60%RH
1	No controll ＜30°C /85%RH
2	One year
2a	4 weeks
3	168 hours
4	72 hours
5	48 hours
5a	24 hours
6	Baking before using, SMT during the time table signs

Notes: Moving, storage, production of module must meet the demand of IPC/JEDEC J-STD-033.

6.2 Production

The module is a humidity sensitive device. If the device needs reflow soldering, disassembly and maintenance, we must strictly comply with the requirements of humidity sensitive device. If module is

damp, a reflow soldering or using a hot-air gun maintenance will lead to internal damage, because the water vapor has the rapid expansion of the burst, causing physical injury to the device, like PCB foaming and BGA component fail. So customers should refer to the following recommendations.

6.2.1 Module confirmation and moisture

The module in the production and packaging process should be strictly accordance with the humidity sensitive device operation. The factory packaging is vacuum bag, desiccant, and humidity indicator card. Please pay attention to the moisture control before SMT and the confirmation of the following aspects.

Demand of Baking confirmation

Smart module uses vacuum sealed bag, which can make it stored for 6 months under the condition of temp 30°C and humidity < 60%. The module should be baked before reflowing soldering if any of the conditions below happen.

1. Storage exceeds the time limit;

2. Package damages and vacuum bags have air leakage;

3. Humidity indicating card change the color at 10%;

4. Module is placed naked in the air over 168 hours.

5. Module is placed naked in the air under 168 hours but not temp 30°C and humidity < 60%.

Baking condition confirmation

The moisture proof level of the smart module is level 3. And the baking conditions are as follows.

Table 6-2　Baking conditions

Baking conditions	120°C/ 5%RH	40°C/ 5%RH

Baking time	4 hours	30days
Description	not use the original tray	Can use the original tray

Note: The original anti-ESD tray temperature does not exceed 50℃. Otherwise the tray will be deformed.

The anti-ESD tray of the original packaging is only used for packaging, and can't be used as a SMT tray.

During taking and placing, please take notes of ESD and cannot be placed as overlay.

Customer product maintenance

If maintenance module after SMT, it is easy for damp module to damage when removing, so the module disassembly and other related maintenance operations should complete within 48 hours after SMT, or need to bake and then maintenance the module.

Because the module return from the field work can't ensure the dry state, it must be baked in accordance with the conditions of baking, then for disassembly and maintenance. If it has been exposed to the humid environment for a long time, please properly extend the baking time, such as 125°C /36 hours.

6.2.2 SMT reflow attentions

The module has the BGA chips, chip resistances and capacitances internally, which will melt at high temperature. If module melt completely encountered a large shock, such as excessive vibration of reflux conveyor belt or hit the board, internal components will easily shift or be false welding. So, using intelligent modules over the furnace need to pay attention to:

● Modules can't be vibrate larger, namely customer requirements as far as possible in orbit (chain) furnace, furnace, avoid on the barbed wire furnace, in order to ensure smooth furnace.

- The highest temperature can't too high. In the condition that meet the welding quality of customer motherboard and module, the lower furnace temperature and the shorter maximum temperature time, the better.

Some customer's temperature curve in the line is not suitable, high temperature is too high, and customer motherboard melt good, but non-performing rate is on the high side. Through the analysis of the causes, it found that melt again of BGA components lead device offset and short circuit. After adjusting the temperature curve, it can ensure that the customer's motherboard the welding quality, and also improve the pass through rate. Non-performing rate is controlled below the 2/10000.

6.2.3 SMT stencil design and the problem of less tin soldering

Part of customers found false welding or circuit short when reflowing. The main reason is module tin less, PCB distortion or tins too large. Suggestions are as follows:

- Suggest use ladder stencil, which means the depth of the region of module is thicker than other areas. Please adjust validation according to the measured thickness of solder paste, the actual company conditions and experience value. The products need to strictly test.

- Stencil: Reference module package, and the user can adjust according to their company experience; Outside of the module, the stencil extends outside. The GND pads use the net stencil.

6.2.4 SMT attentions

If customer motherboard is thin and slender with a furnace deformation, warping risks, you will be suggested to create "a furnace vehicle" to ensure the welding quality. Other production proposals are as follows:

- The solder pastes use brands like Alfa.

- The module must use the SMT machine mount (important), and do not recommend manually placed or manual welding.

- For SMT quality, Please ensure the necessary condition according to actual condition of factory before SMT, like SMT pressure, speed (very important), stencil ways.

- We must use the reflow oven more than 8 temperature zones, and strictly control the furnace temperature curve.

Recommended temperature:

B. constant temperature zone: temperature 160-190°C, time: 60s-100s.

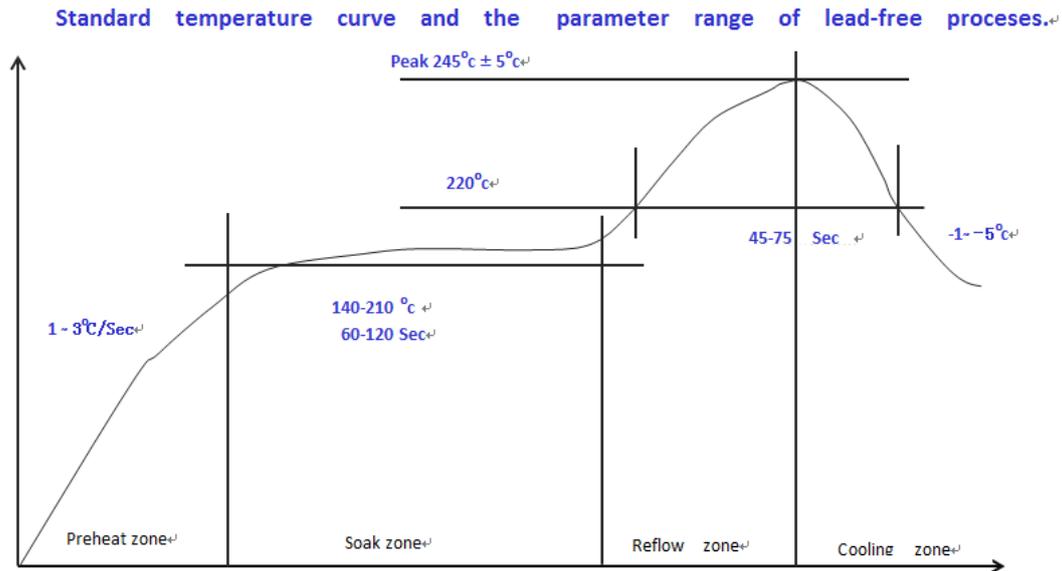E. recirculation zone: PEAK temperature 235-245°C, time over 220°C: 30s-60s.

图 7-1 炉温曲线

Note: customer's board deformation must be controlled well. By reducing the number of imposition or increasing patch clamp to reduce the deformation.

Module thickness of the stencil is recommended to be thickened, and the rest position can be maintained by 0.1mm.

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7. Safety Information

For the reasonable usage of the module, please comply with all these safety notices of this page. The product manufacturers should send followed safety information to user, operator or product's spec.

	The devices using the module may disturb some electronic equipment. Put the module away from the phone, TV, radio and automation equipment to avoid the module and the equipment to interfere with each other.
	Shut down the mobile device or change to flying mode before boarding. The Using of wireless appliances in an aircraft is forbidden to avoid the interference, or else cause to unsafe flying, even violate the law.
	In hospital or health care center, switch off the mobile devices. RF interference may damage the medical devices, like hearing-aid, cochlear implant and heart pacemaker etc.
	Mobile devices can't guarantee to connect in all conditions, like no fee or with an invalid SIM card. When you need emergent help, please remember using emergency calls and make sure your device power on in an area with well signal.
	Put the module away from inflammable gases. Switch off the mobile device when close to gas station, oil depot, chemical plant etc.
	The module is not water proof. Please don't use the module in the area with high humidity like bathroom, which will decelerate the physical performance, insulation resistance and mechanical strength.
	Non-professionals can't teardown the module which will damage it. Refer to the specification or communicate the related staffs to repair and maintain it.
	Please switch on the module before cleaning. The staffs should be equipped with anti-ESD clothing and gloves.

The users and product manufacturers should abide by the national law of wireless modules and devices. If not, JSC NIIMA PROGRESS and NAVIA LLC will not respond the related damages.