

HiHope Neptune Series

Neptune 501 Module Hardware Specification Sheet

Model: HH-SLNPT501

V1.0



Record of Changes

Versions	Date	Author	Checker	Remark
V1.0	2021-10-11	特穆其勒图		

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1 Summarize

Neptune series HH-SLNPT501 adopts highly integrated Bluetooth BLE5.1+BR+EDR chip dual-mode data transmission module, built-in high-performance transceiver, powerful baseband processor, built-in FLASH program memory suitable for customized applications, better protection of application security. Module chip built-in 32-bit DSP chip, up to 240MHz processor speed, support for MP3, WMA, WAV, AAC, AIF and other audio decoding, and at the same time with USB2.0, PWM, UART, IIC, ADC, and a variety of peripheral interfaces, is a powerful, cost-effective Bluetooth integrated solution module.

1.1 Main Application Areas

- Intelligent Control
- Industrial Control
- IoT Applications
- Audio Applications
- Earphones

1.2 Characterization

- Perfectly solve the Android system (Android 4.4 can be perfectly compatible, 4.3 system only supports one-way), IOS system at the same time.

Problems with HH-SLNPT501 Bidirectional Transmission.

- User interface using universal serial port design, full duplex bidirectional communication.
- Dual 16-bit DAC , SNR>=95dB, Triple 16-bit ADC , SNR>=90dB
- 8K~48KHz Sample Rate Support
- Ultra-small size: 12.6mm*16.8mm*2.8mm

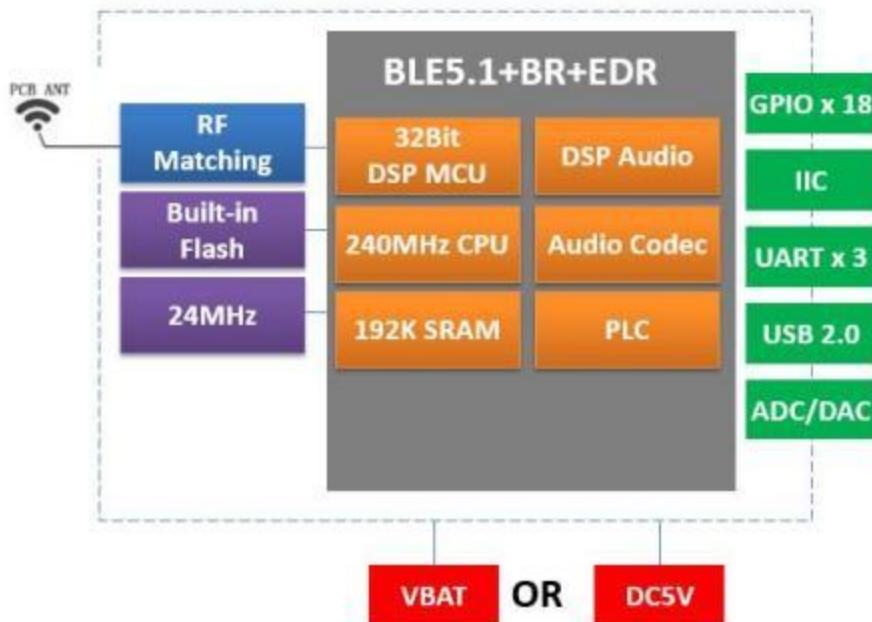
2 Hardware Introduction

2.1 Module Technical Parameters

Model Number	HH-SLNPT501
Microchip	AC6956C
Bluetooth Protocol	Bluetooth BLE V5.1 , BR , EDR
Supply Voltage	VBAT 为 2.2-5.5V, VDDIO 为 2.2-3.6V, selectable
Support V5.1 Bluetooth Protocol Stack	ATT , GATT , SMP , L2CAP , GAP , A2DP , AVCTP..
Operating Current	$\leq 10\text{mA}$ (simple application $20\text{uA} \sim 5\text{mA}$)
Sleep Current	be lower than 2uA
Temperature Range	-20°C to +80°C
Wireless Transmission Range	0~100 m
Transmission Power	Maximum Adjustable 6dBm, Default use of standard specifications 0dBm
Sensitivity	-93dBm<0.1%BER
Frequency Range	2.402GHz-2.480GHz
External Interface	IO,UART,SPI,PWM,ADC,IIC
Module Size	12.6mm*16.8mm*2.8mm

2.2 Module Block Diagram

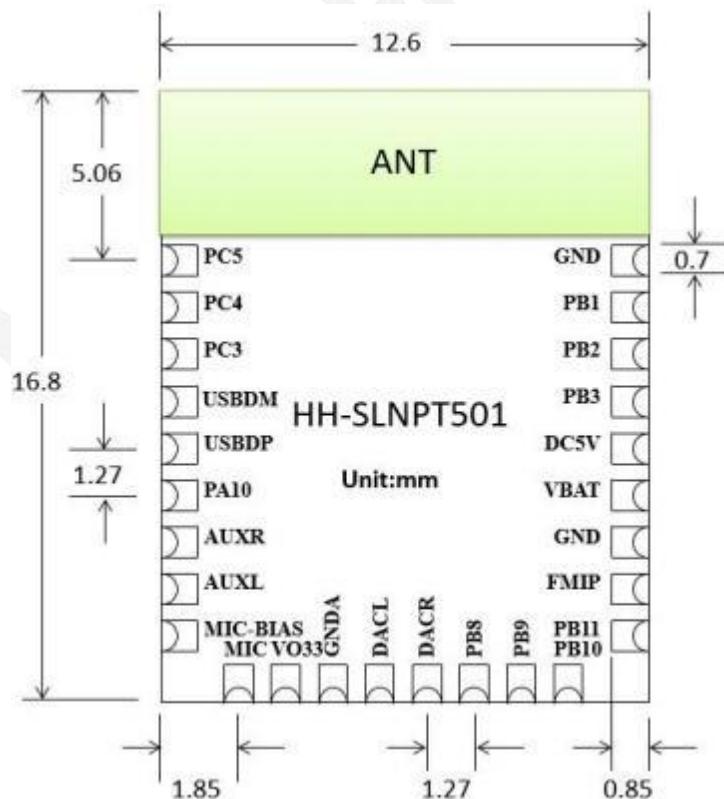
The block diagram of the module is as follows:



2.3 Structural Dimensions

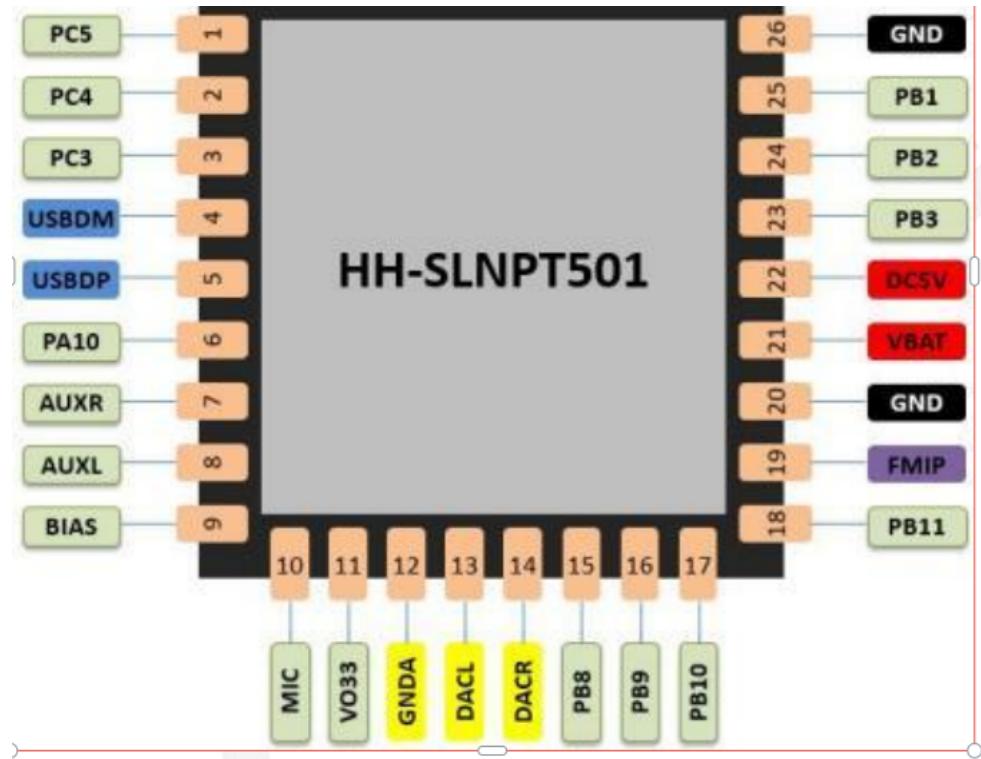
2.3.1 Physical Dimensions

Physical dimensions(unit: mm) The figure below , 12.60mm*16.80mm*2.8mm



2.4 Pin Definitions

2.4.1 Pin Assignment Diagram



2.4.2 Pin Description

Pin	Symbol	I/O	Description
1	PC5	I/O	SD1CLKA, SPI1DOB, UART2RXD, IIC_SDA_B, ADC13, PWMCH5L
2	PC4	I/O	SD1CMDA, SPI1CLKB, UART2TXD, IIC_SCL_B, ADC10, PWMCH5H
3	PC3	I/O	SD1DAT0A, SPI1DIB
4	USBDM	I/O	UART1RXD, IIC_SDA_A, PULL-DOWN
5	USBDP	I/O	UART1TXD, IIC_SCL_A, ADC12, PULL-DOWN
6	PA10	I/O	SD0CLKA, ALNK0_LRCKB, ADC3, SPDIF_IN_B, TMR1, TOUCH9, UART2RXB, PWMCH4L

7	AUXR	I/O	PA1, AMUX0R, TOUCH1, ADC0, UART1RXC, PWMCH0L
8	AUXL	I/O	PA0, AMUX0L, TOUCH0, CLKOUT0, UART1TXC, PWMCH0H
9	BIAS	I/O	PC7, MIC_BIAS
10	MIC	I	MIC
11	VO33	O	3.3V OUTPUT, <100mA
12	GNDA	P	DAC GROUND
13	DACL	O	DAC LEFT CHANNEL
14	DACR	O	DAC RIGHT CHANNEL
15	PB8	I/O	AMUX1R, SPI2_DIA, ADC8, CLKOUT1
16	PB9	I/O	AMUX2L, SPI2_CLKA, ADC8, CAP0, UART2TXC, PWMCH3H
17	PB10	I/O	AMUX2R, SPI2DOA, ADC9, RX2, PWMCH3L
18	PB11	I/O	SDPG,SPDIF_OUT
19	FMIP	I	FM SINGLE INPUT
20	GND	P	GND
21	VBAT	P	POWER IN:2.2~5.5V
22	DC5V	P	POWER IN: 4.5~5.5V
23	PB3	I/O	PWM2, ADC6
24	PB2	I/O	SPI1DIA, PWMCH1L
25	PB1	I/O	SPI1DOA, PULL-UP
26	GND	P	GND

3 Electrical Parameters

Parameters		Prerequisite	Minimum value	Typical value	Maximum value	Unit
Storage temperature		-	-30	Normal	155	°C
Welding temperature		IPC/JEDEC J-STD-020	-	-	260	°C
Operating voltage		-	2.2	3.3	5.5	V
I/O	VIL/VIH	-	-/0.3*VDD	-	0.7*VDD/-	V
	VOL/VOH	-	-/2.7	-	0.33/-	
Discharge parameters (mannequin)	TAMB = 25°C	-	-	-	2	KV

4 Power Wastage

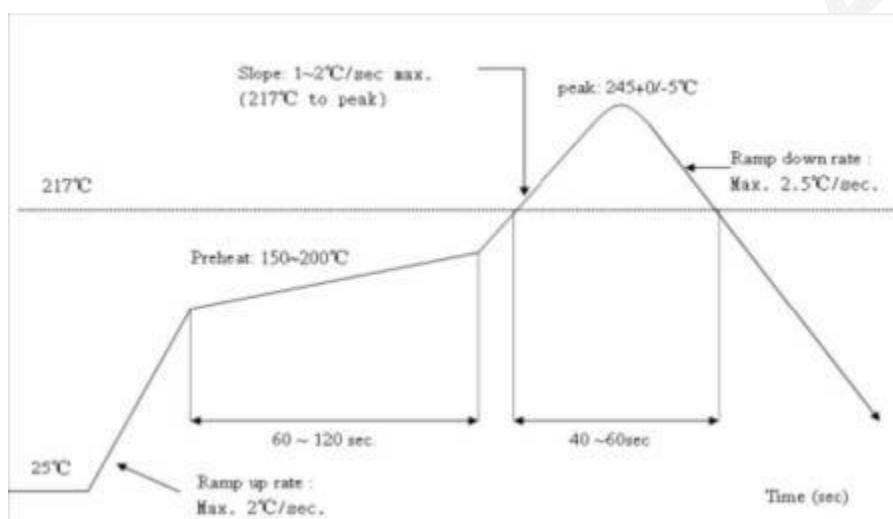
Parameters		Minimum value	Typical value	Maximum value	Unit
Deep sleep	-	2	-	-	uA
RX mode@3.3V	-	7	-	-	mA
TX mode@3.3V	-	8	-	-	mA

5 RF Parameters

Parameters	Minimum value	Typical value	Maximum value	Unit
Operating frequency	2400	-	2480	MHz
Output power	-20	-	6	dBm

Receiver sensitivity	-	-90	-	dBm
Neighboring channel transmission power @+2MHz	-	-40	-	dBm
Neighboring channel transmission power @-2MHz	-	-38	-	dBm
Neighborhood suppression	-	-13	-	dB

6 Welding Curve



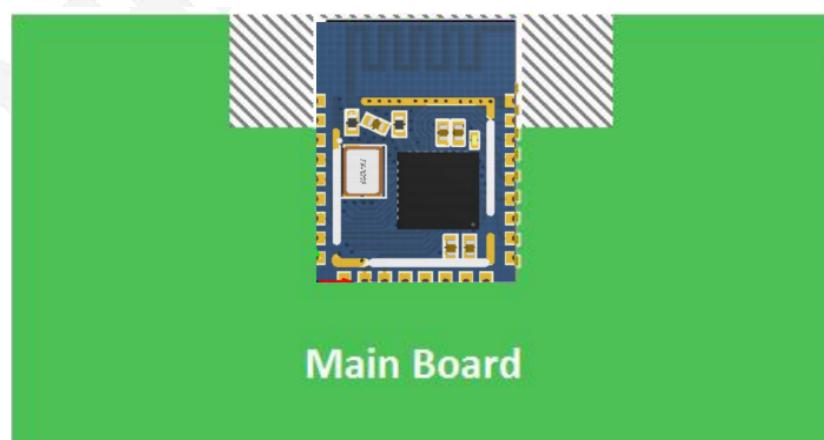
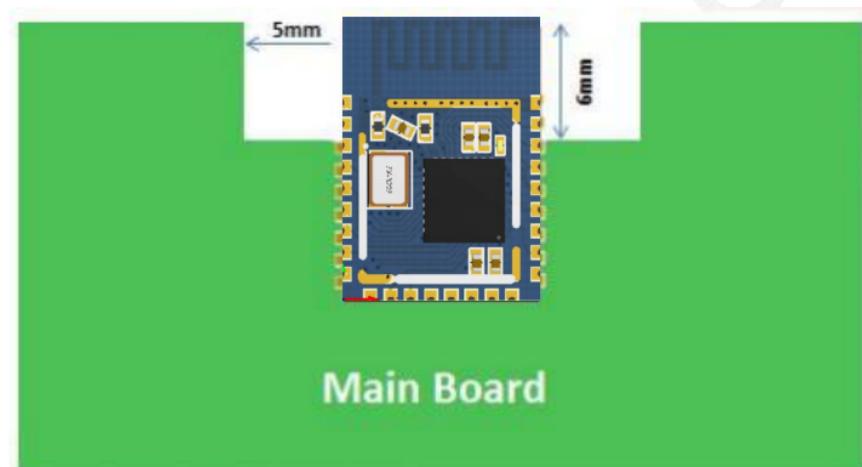
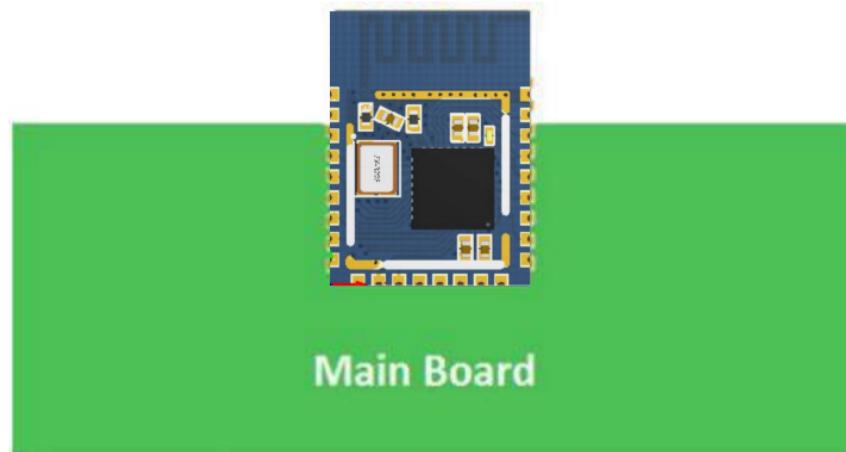
7 Recommended Designs

The Bluetooth module can be soldered directly to the PCB. In order to get the best RF performance of your end product, please pay attention to the reasonable design of module and antenna placement on the base plate according to this guide. For the PCB antenna version of the module, there are three options available.

Option 1: Preferred option: the module is placed against the edge of the board, and the antenna is all exposed, and there is no metal material around the antenna, including wires, metal casings, counterweight plates, etc.

Option 2: Sub-optimal solution: the module is placed against the edge of the board, the antenna is hollowed out underneath and leaves a gap of not less than 5mm with the surrounding PCB, and there is no metal substance around the antenna, including wires, metal casings, counterweight plates, etc.

Option 3: General scheme: the module is placed against the board edge, the PCB area under the antenna is clear, no copper can be laid.



8 Peripheral Alignment Recommendations

The module integrates high-speed GPIO and peripheral interfaces, which may generate serious switching noise. If some applications require high power consumption and EMI characteristics, it is recommended to connect 10~100 ohm resistors in series on the digital I/O lines. This suppresses overshoot and smooths the signal when switching the power supply, and this practice also provides some protection against electrostatic discharge (ESD)

9 FCC Statement

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.

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:2BG7CHZKGBT0001** Or Contains **FCC ID: 2BG7CHZKGBT0001**"

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.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1. The module is limited to OEM installation ONLY
2. The OEM integrators is responsible for ensuring that the end-user has no manual instructions to remove or install module
3. The module is limited to installation in mobile or fixed applications, according to Part 2.1091(b)
4. The separate approval is required for all other operating configurations, including portable configurations with respect to configurations

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 Single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C : **15.247** requirement, Only if the test result comply with FCC part 15C : **15.247** requirement, then the host can be sold legally.

Antenna information

Antenna Type	Antenna Gain
PCB antenna	2.57 dBi

Trace antenna designs: Not applicable.

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