

Bluetooth Module User Manual

SY-BK0006



Overview

The SY-BK0006 of Shenyun IOT (Shenzhen) Technology Co., Ltd. is a low-power BLE module and conforms to the SIG BLE 4.2 version.

SY-BK0006 can realize the transparent transmission of data between the module and the mobile phone. As a slave, you can set the parameters through the AT command set.

Module Parameters

Module parameters	PCB size	21.6 * 15.1*3.1 mm
	Interface	1.27 mm stamp half hole
	Receiving sensitivity	-96dbm
	Interface mode	serial port UART
	Working voltage	1.8V – 3.6V
	Operating temperature	-40°C - +85°C
	Antenna	Onboard antenna
	Transmission distance	30 meters
	Transmission rate	2K Byte/s
	Bluetooth version	BLE4.2
	Software support	Support APP and WeChat applet

Factory Settings

Module Role	Slave
Broadcast Name	BK_XXXXXXXX (the first 4 bytes of MAC address)
Broadcast Interval	100ms
The longest serial port frame	200 Byte
Module address	MAC address
Serial port baud rate	9600 bps, 8 data bits, 1 stop bit, no parity

Connection parameters	Default parameters	The setting of module connection parameters will affect: The speed of data transmission between the module and the mobile phone, the shorter the connection parameter, the faster the speed
Conn_min	8	
Conn_max	10	
Laytency	0	
Timeout	600	

UUID

UUID	Parameter	Description
Service UUID	0XFEE0	Main service channel
Notify Characteristic UUID	0XFEE1	module --> APP
Write Characteristic UUID	0xFEE2	APP --> Module

Power consumption

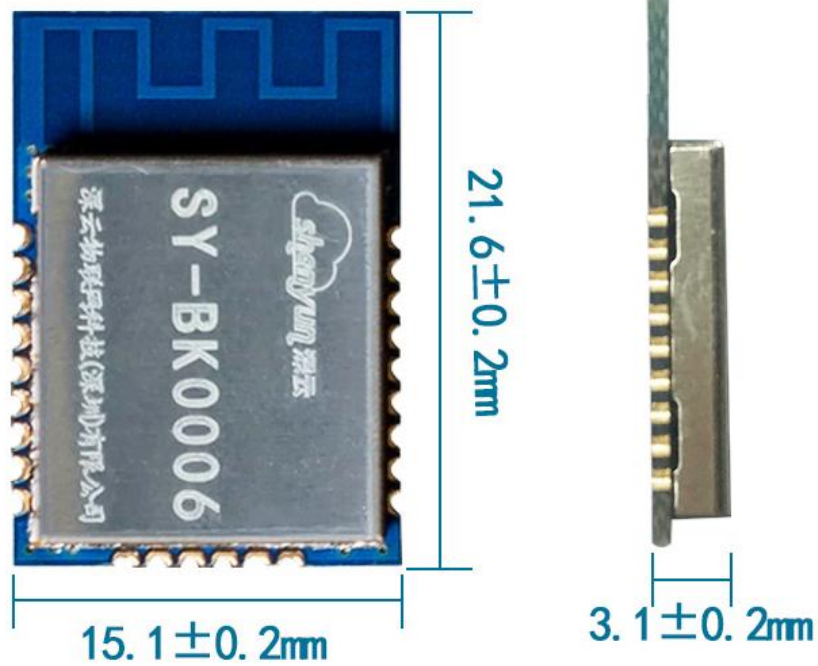
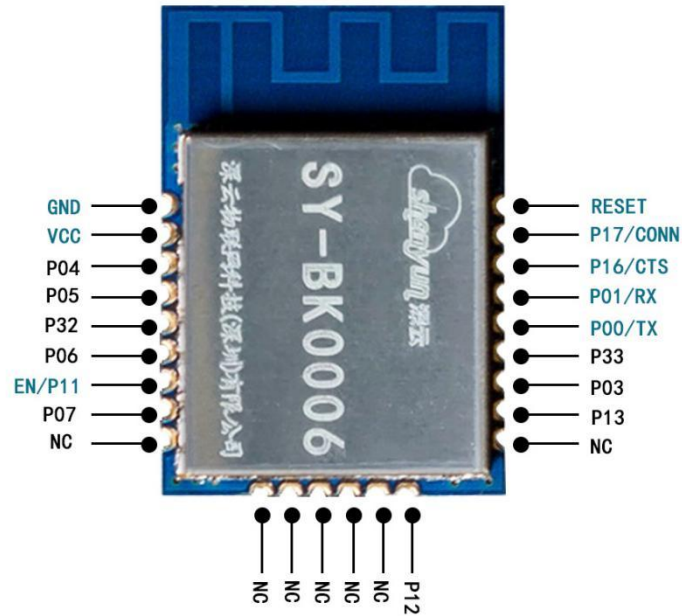
Power consumption in each state

Module status	Parameter	Staus	UART	Power consumption (typical value)
Power-on	Default	Open Broadcast	Close	160uA
Power-on	Default	Open Broadcast	open	1.67mA
Connect(IOS)	90, 3, 600	Connect	Close	38uA
Connect(Android)	80, 3, 600	Connect	Close	42uA
TX active	Default	Continuously transmiss 20 bytes of data every 100ms	open	2.03mA
RX active	Default	Continuously receive 20 bytes of data every 100ms	open	1.98mA

Average static power consumption

Broadcast Interval	Average Current
100ms	160uA
500ms	40uA
1s	25uA

Pin&Size



Pin	Corresponding Number	Function Description
RXD	P0.1	connect to external MCU TX
TXD	P0.0	connect to external MCU RX
VCC		power supply
GND		ground
Bluetooth connection indication (output)	P1.7	L: not connected H: Connected
Module serial port EN (input)	P1.1	L: serial port is open H: The serial port is closed
Serial output indication (output)	P1.6	MCU low power control pin L: APP has no data to send H: APP has data to send

Description of serial port sending data:

1. External MCU --> Module

Serial port package is 20 bytes

When more than 20 bytes, the module will start Bluetooth to send to APP

When less than 20 bytes, and the serial port data is empty for more than 10ms, the module will start Bluetooth to send to APP

2. Module --> External MCU

When the module receives the APP data, send data to external MCU through serial port

Mobile Test APP

IOS system: please use Lightblue or nRF Connect



For Android: please use Shenyun Universal Android Test App



For APP of Shenyun IOT (Shenzhen) Technology Co.,Ltd., please contact our staff to obtain it.

AT command set

Description:

1. AT command does not need to add Enter key (\r), Newline(\n)
2. Some AT commands need to be restarted to take effect
3. The return of the command all ends with \r\n

Setting Command

Function	command	Return	Remarks
Module reset	AT+RST	OK	100ms after executing the command
Set the broadcast name	AT+NAME=	OK	The broadcast name must be within 20 bytes, it will take effect immediately E.g: AT+NAME=SYIOT Means: the broadcast name is "SYIOT"
Set the broadcast interval	AT+ADV=	OK	0.625ms per unit, it will take effect immediately after execution E.g: AT+ADV=160 Indicates that the broadcast interval is set to 160*0.625=100ms
Set UART Rate	AT+UART=	OK	The baud rate can be set 2400, 4800, 9600, 19200, 38400, 57600, 74880, 115200 No parity Data bits: 8 bits Stop bit: 1 bit
Set connection parameters	AT+CONN=C onn_min,Conn _max,lacency,T imeout	OK	Conn_min: minimum connection parameters (8-10000) Conn_max: Maximum connection parameter (8-10000) Lacency: Delay (0-4) Timeout: timeout, in ms
Set the broadcast data packet	AT+AD_DATA =	OK	The content of the broadcast data packet, the maximum length is 22 bytes If the module is in the broadcast state, update immediately If the module is connected, update after disconnection
Set transmit power	AT+dBm=	OK	0: -26 dBm 1: -6 dBm 2: 0 dBm 3: +3 dBm

			Effective after restarting the module
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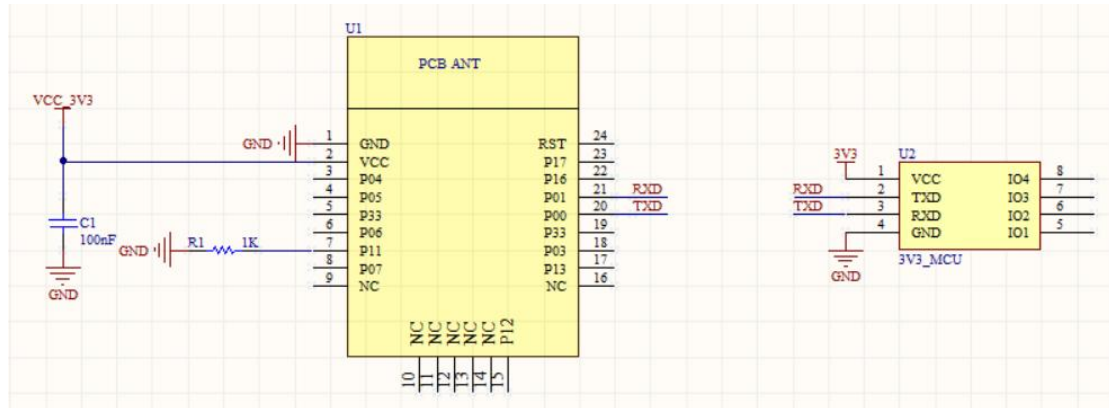
Inquire Command

Function	Command	Return	Remarks
Inquire broadcast name	AT+NAME	BK_XXXXXXXX	
Inquire the broadcast interval	AT+ADV	XXX	0.625ms per unit Broadcast interval calculation formula: Interval=XXX * 0.625
Inquire serial port baud rate	AT+UART	XXXX	
Inquire connection parameters	AT+CONN	Conn_min,Conn_max,layency,Timeout	E.g: 8,8,0,100
Inquire broadcast data packet	AT+AD_DATA	AD:XXXXXXXX	
Inquire transmit power	AT+dBm	dBm:x	0: -26 dBm 1: -6 dBm 2: 0 dBm 3: +3 dBm
Inquire the MAC address	AT+MAC	MAC Address	E.g: 795544A02225
Inquire software version	AT+VER	V1.6	

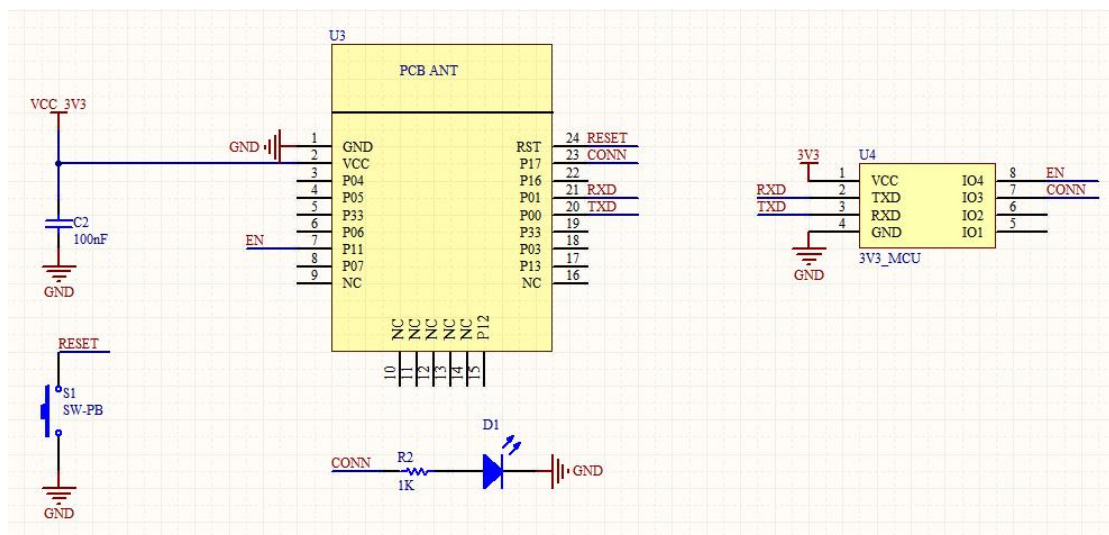
Reference Design

Simple Design Drawing

Only VCC, GND, TXD, RXD modules are required to work!



Typical Design Drawing



Appendix

Measured power consumption data

Module model	SY-BK0006
Module firmware	BK0006_AT_SPS_V1.0.hex
Power consumption test tool	EFM32 Giant Gecko Starter Kit
Power consumption test software	Simplicity Studio-Energy Profiler
APP	IOS (iPhone7P) : LightBule Android (OPPO ACE2) : BLE Assist
PC Software	UartAssist

The following power consumption is measured data:

Item	Description	Power
Broadcast, UART closed	100ms broadcast interval	375.95uA
Broadcast, UART opened	100ms broadcast interval	2.63mA
Broadcast, UART closed	500ms broadcast interval	92.52uA
Broadcast, UART opened	500ms broadcast interval	2.45mA
Broadcast, UART closed	1000ms broadcast interval	50.82uA
Broadcast, UART opened	1000ms broadcast interval	2.43mA
Connected, UART closed, Default connection parameters: 8,10,0,600	IOS connected, UART closed	774.10uA
	5X connected, UART closed	1.51mA
Connected, UART opened, Default connection parameters: 8,10,0,600	IOS connected, UART opened	2.83mA
	5X connected, UART opened	3.25mA
Connected, UART opened, Default connection parameters, send 20 bytes of data continuously in 100ms	IOS connected, UART opened	2.83mA
	5X connected, UART opened	3.26mA
Connected, UART opened, Default connection parameters, receive 20 bytes of data continuously in 100ms	—	—
	5X connected, UART opened	3.20mA

1.1 List of applicable FCC rules:

The module complies with FCC Part 15.247

1.2 Summarize the specific operational use conditions:

The module has been certified for mobile application(20 cm separation). This transmitter must not be

co-located or operating in conjunction with any other antenna or transmitter.

1.3 Limited module procedures:

Not applicable.

1.4 Trace antenna designs:

Not applicable.

1.5 RF exposure considerations:

This equipment complies with FCC's RF radiation exposure limits set forth for an uncontrolled

environment. The antenna(s) used for this transmitter must not be collocated or operating in

conjunction with any other antenna or transmitter.

Any deviation in conditions or host configuration will require approval and FCC filing by the Grantee in

accordance with KDB 447498

1.6 Antennas:

Type	Gain	Impedance	Application	Min Separation
Min Separation	0.65dBi	50Ω	Fixed	

The antenna is permanently attached, can't be replaced.

1.7 Label and compliance information:

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. NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

Warning: Changes or modifications to this unit 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:

- o Reorient or relocate the receiving antenna.
- o Increase the separation between the equipment and receiver.
- o Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- o Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC's and IC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

The system integrator must place an exterior label on the outside of the final product housing the SY-BK0006-V3905 Module. Below are the contents that must be included on this label.

OEM Labeling Requirements:

NOTICE: The OEM must make sure that FCC labeling requirements are met. This includes a clearly

visible exterior label on the outside of the final product housing that displays the contents shown in

below:

Model : SY-BK0006-V3905
Contains FCC ID: 2ADDW-SYBK0006V3905

1.8 Information on test modes and additional testing requirements:

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04 Module Integration Guide for testing the host products. The host

manufacturer may operate their product during the measurements. In setting up the configurations, if the pairing and call box options for testing does not work, then the host product manufacturer should coordinate with the module manufacturer for access to test mode software.

1.9 Additional testing, Part 15 Subpart B disclaimer:

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) list on the

grant, and that the host product manufacturer is responsible for compliance to any other FCC rules

that apply to the host not covered by the modular transmitter grant of certification. The final host

product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when

contains digital circuitry.

2.0 Note EMI Considerations

The host responsible party integrator must perform EMC tests on the module during synchronous

transfer operations when integrating on the host. If there are no emissions of increased magnitude

and/or different frequencies compared to the data reported in the module authorization, there is no

need to submit the results of these simultaneous transmission test data.

KDB publication 996369 D02 and D04 for guidance on module integration and best practices.

Co-launching with other modules can refer to KDB publication 996369 D02 and D04, while allowing

the host manufacturer to confirm compliance.

2.1 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously

transmitting condition or different operational conditions for a stand-alone modular transmitter in a host,

host manufacturer have to consult with module manufacturer for the installation method in end system.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil est conforme aux limites d'exposition au rayonnement RF stipulées par la FCC et l'IC pour une utilisation dans un environnement non contrôlé. Les antennes utilisées pour cet émetteur doivent être installées et doivent fonctionner à au moins 20 cm de distance des utilisateurs et ne doivent pas être placées près d'autres antennes ou émetteurs ou fonctionner avec ceux-ci.