LoRa product

The LoRa series modules are based on the SX127X/SX126X/LLCC68 series chips. They primarily use LoRa™ remote modems for ultra-long range spread spectrum communication. Strong anti-interference ability, high reliability, low power consumption.

LoRa series			
Model	Ra-01S	Ra-01SC	Ra-01SCH
Picture			
Package	SMD-16	SMD-16	SMD-16
Size	17.0*16.0*3.2（±0.2）mm	17.0*16.0*3.2(±0.2)mm	17.0*16.0*3.2(±0.2)mm
Antenna	Through Hole Pad/Compatible with half hole pads（Antenna to be welded）/IPEX	Through Hole Pad/Compatible with half hole pads（Antenna to be welded）/IPEX	Through Hole Pad/Compatible with half hole pads（Antenna to be welded）/IPEX
Frequency	410MHz~525MHz	410MHz~525MHz	803MHz~930MHz
Chip	SX1268	LLCC68	LLCC68
Characteristics	Pure RF module, support to send and receive signals	Pure RF module, support to send and receive signals	Pure RF module, support to send and receive signals
Supply voltage	voltage：2.7V~3.6V，Typical 3V3, current＞200mA	voltage：2.7V~3.6V，Typical 3V3, current＞200mA	voltage：2.7V~3.6V，Typical 3V3, current＞200mA
Operating current	MAX 140mA	MAX 140mA	MAX 110mA
Receive/standby current	4.5mA/1.6mA	4.2mA/0.6mA	4.2mA/0.6mA
Interface	SPI	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Programmable bit rate	Up to 300kbps	Up to 300kbps	Up to 300kbps
Maximum output	As low as-140dBm	As low as-129dBm	As low as-129dBm
Output Power	MAX+21dBm	MAX+21dBm	MAX+21dBm
Test distance (Open space outside)	With a spring antenna 2.8km	With the suction cup antenna 4.7km	With the suction cup antenna 4.7km
Modulation mode	FSK/GFSK/LoRa™	FSK/GFSK/LoRa™	FSK/GFSK/LoRa™
Certification	CE/FCC/REACH/RoHS	CE/FCC/REACH/RoHS	CE/FCC/REACH/RoHS
Application	Automatic meter reading, Home building automation, Security systems, Remote irrigation systems, Animal husbandry		

LoRa product

The LoRa series modules are based on the SX127X/SX126X/LLCC68 series chips. They primarily use LoRa™ remote modems for ultra-long range spread spectrum communication. Strong anti-interference ability, high reliability, low power consumption.

LoRa series		
Model	Ra-01SH	Ra-01
Picture		
Package	SMD-16	SMD-16
Size	17.0*16.0*3.2(±0.2)mm	17.0*16.0*3.2(±0.2)mm
Antenna	Through hole pad/compatible half hole pad (antenna to be welded) /IPEX	Through hole pad/compatible half hole pad (antenna to be welded)
Frequency	803MHz~930MHz	410MHz~525MHz
Chip	SX1262	SX1278
Characteristics	Pure RF module, support to send and receive signals	Pure RF module, support to send and receive signals
Supply voltage	voltage：2.7V~3.6V，Typical 3V3,current＞200mA	voltage：2.7V~3.6V，Typical3V3,current＞200mA
Operating current	140mA	105mA
Receive/standby current	4.2mA/1.6mA	12.15mA/1.6mA
Interface	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Up to 300kbps	Up to 300kbps
Rx sensitivity	As low as-140dBm	As low as-140dBm
Output Power	MAX+21dBm	MAX+19dBm
transmission distance(Open space outside)	With a spring antenna 2.8km	With a spring antenna 2.8km
Modulation mode	FSK/GFSK/LoRa™	FSK/GFSK/MSK/GMSK/LoRa™/OOK
Certification	CE/FCC/REACH/RoHS	CE/FCC/REACH/RoHS
Application	Automatic meter reading, Home building automation,Security systems, Remote irrigation systems, Animal husbandry	

LoRa product

The LoRa series modules are based on the SX127X/SX126X/LLCC68 series chips. They primarily use LoRa™ remote modems for ultra-long range spread spectrum communication. Strong anti-interference ability, high reliability, low power consumption.

LoRa series		
Model	Ra-01H	Ra-02
Picture		
Package	SMD-16	SMD-16
Size	17.0*16.0*3.2(±0.2)mm	17.0*16.0*3.2（±0.2）mm
Antenna	Compatible half-hole pad/through-hole pad (antenna to be welded)	IPEX
Frequency	803MHz~930MHz	410MHz~525MHz
Chip	SX1276	SX1278
Characteristics	Pure RF module, support to send and receive signals	Pure RF module, support to send and receive signals
Supply voltage	voltage：2.7V~3.6V，Typical3V3,current > 200mA	voltage：2.7V~3.6V，Typical 3V3,current > 200mA
Operating current	105mA	105mA
Receive/standby current	12.15mA/1.6mA	12.15mA/1.6mA
Interface	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，< 90%RH	-40℃~+125℃，< 90%RH
Rate	Up to 300kbps	Up to 300kbps
Rx sensitivity	As low as-140dBm	As low as-141dBm
Output Power	MAX+19dBm	MAX+19dBm
transmission distance(Open space outside)	With a spring antenna 2.8km	With the suction cup antenna 4km
Modulation mode	FSK/GFSK/MSK/GMSK/LoRa™/OOK	FSK/GFSK/MSK/GMSK/LoRa™/OOK
Certification	CE/FCC/REACH/RoHS	REACH/RoHS
Application	Automatic meter reading, Home building automation, Security systems, Remote irrigation systems, Animal husbandry	

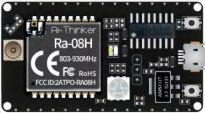# LoRaWAN product

The Ra-08/08H module corresponds to the ASR6601 chip, 128 KB Flash, 16 KB SRAM, and 32-bit 48 MHz ARM Cortex-M4 kernel. Factory built-in AT firmware program, directly use to connect to LoRaWAN gateway。

LoRaWAN series		
Model	Ra-08	Ra-08H
Picture		
Package	SMD-18	SMD-18
Size	16.0*16.0*3.2（±0.2）mm	16.0*16.0*3.2(±0.2)mm
Antenna	Compatible half-hole pad/through-hole pad (antenna to be welded)/IPEX	Compatible half-hole pad/through-hole pad (antenna to be welded)/IPEX
Frequency	410MHz~525MHz	803MHz~930MHz
Chip	ASR6601	ASR6601
Characteristics	Support LoRaWAN and LinkWAN protocols, support private protocol development	Support LoRaWAN and LinkWAN protocols, support private protocol development
Supply voltage	voltage：2.7V~3.6V，current > 500mA	voltage：2.7V~3.6V，current > 500mA
Full load mode (TX:21dBm)	115mA	115mA
Reception mode （RX:SF10）	9.5mA	9.5mA
Deep sleep current	0.9μA	0.9μA
Interface	UART/GPIO/ADC/DAC/I2C/I2S/SPI/PWM	UART/GPIO/ADC/DAC/I2C/I2S/SPI/PWM
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，< 90%RH	-40℃~+125℃，< 90%RH
Rate	Support 110~460800bps，Defaul 9600bps	Support 110~460800bps，Defaul 9600bps
Output Power	MAX+22dBm	MAX+22dBm
Modulation mode	LoRa/(G)FSK/BPSK/(G)MSK	LoRa/(G)FSK/BPSK/(G)MSK
SPI Flash	128KB	128KB
Certification	CE/FCC/REACH/RoHS	CE/FCC/REACH/RoHS
Application	Smart instrumentation, Supply chain and logistics, Home building automation, Security systems, Remote irrigation systems	

LoRaWAN product

LoRaWAN series development board is based on the LoRaWAN series modules. The development board is equipped with LoRaWAN module, and leads to the serial port and peripheral pins, through the access to the serial port firmware assistant to send instructions can be easily controlled by the LoRaWAN transceiver.

LoRaWAN series		
Model	Ra-08-Kit	Ra-08H-Kit
Picture		
Model	Ra-08	Ra-08H
Package	DIP-30(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)
Size	25.4*48.26*3.0(±0.2)mm	25.4*48.26*3.0(±0.2)mm
Antenna	External SMA port is connected	External SMA port is connected
Frequency	410MHz~525MHz	803MHz~930MHz
Chip	ASR6601	ASR6601
Rate	Low rate serial port，Default 9600 bps	Low rate serial port，Default 9600 bps
Supply voltage	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：2.7V~3.6V，current：＞500mA，Recommend 3V3	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：2.7V~3.6V，current：＞500mA，Recommend 3V3
Output Power	MAX+22dBm	MAX+22dBm
Interface	UART/GPIO/ADC/DAC/I2C/I2S/SPI/PWM	UART/GPIO/ADC/DAC/I2C/I2S/SPI/PWM
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Power Consumption	Deep sleep：0.9μA、Standby current：3.83mA、Full load mode（TX:21dBm）:115mA、RX mode（RX:SF10）:9.5mA	Deep sleep：0.9μA、Standby current：3.83mA、Full load mode（TX:21dBm）:115mA、RX mode（RX:SF10）:9.5mA
Transport Protocol	LoRaWAN，LinkWAN	LoRaWAN，LinkWAN
SPI Flash	128KB	128KB
Application	Use in development phase	

LoRaWAN Gateway product

RG-02 is an indoor LoRaWAN gateway.Support Semtech data packet transponders and LoRaWAN base station functions, and is compatible with standard LoRaWAN protocol. Support WiFi, Ethernet, 3G/4G cellular.

LoRaWAN Gateway		
Model	RG-02 (CN470low-frequency edition)	RG-02 (EU868low-frequency edition)
Picture		
Size	12.0*8.5*3.0(±0.2)cm	12.0*12.0*3.0(±0.2)cm
Working Band	CN470	EU868，IN865，RU864，KZ869
Frequency range	410~510MHz	863-870MHz
LoRa Gateway	SX1301+2*SX1257	SX1302+2*SX1250
Sensitivity	-142.5dBm	-140.0dBm
Power supply	12V @ 2A	5V @ 2A
Cellular 4G LTE	Region: China/India	Region: Europe/Middle East/Africa/Korea/Thailand
Antenna	Plastic rod antenna(LoRa)+paddle antenna(4G)+PCB antenna(WiFi)	Plastic rod antenna(LoRa)+paddle antenna(4G)+PCB antenna(WiFi)
Networking Mode	Ethernet/Wi-Fi/3G/4G cellular	Ethernet/Wi-Fi/3G/4G cellular
output power	Max:27dBm	Max:27dBm
CPU	AR9331 400MHz	AR9331 400MHz
Memory	64MB DDR + 16MB FLASH	64MB DDR + 16MB FLASH
WiFi	IEEE802.11b/g/n	IEEE802.11b/g/n
Ethernet network	10m/100m	10m/100m
Application	Animal husbandry, Remote meter reading, Manhole cover monitoring, Smart home, Street lamp monitoring, Fire protection	

Radar product

Rd-01 is a radar +WiFi+BLE module developed by Shenzhen Ai-Thinker Technology Co.,It supports 24G radar、WiFi、BLE mesh, and supports a variety of sleep modes

Radar products	
Model	Rd-01
Picture	
Package	SMD-12/6Pin 插座
Size	35.0*18.0*6.4(±0.2)mm
Antenna	Radar：PCB on-board antenna/WiFi+BLE：IPEX kind of antenna
Frequency range	Radar：24GHz~240.25GHz WiFi+BLE：2400MHz~2483.5MHz
Chip	BLE602+S3KM111L
Module features	BT:Bluetooth 5.0，WiFi：802.11b/g/n
Supply voltage	voltage：2.7V~3.6V
Supply current	current≥500mA
Support interface	UART/GPIO/ADC/PWM/I2C/SPI
Operating temperature	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH
Serial port baud rate	Default 115200kbps
Flash	built-in 2MByte
Security	WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
Certification	*
Application	Internet of Things（IoT），Mobile devices, Wearable electronic devices, Smart home, Smart light control, Life sense and other fields

Ai-WB2 series module is a WiFi+ Bluetooth module developed by Ai-Thinker. Bluetooth low power 5.0, BLE Mesh; Support multiple sleep modes, deep sleep current 12μA.

	Ai-WB2 series		
Model	Ai-WB2-12F	Ai-WB2-32S	Ai-WB2-13
Picture			
Package	SMD-22	SMD-38	SMD-18
Size	24.0*16.0*3.1(±0.2)mm	25.5*18.0*3.1(±0.2)mm	20.0*18.0*3.1(±0.2)mm
Antenna	On board antenna	On board antenna/IPEX	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	BL602	BL602	BL602
Characteristics	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh
power supply	voltage 2.7V~3.6V, current ≥500mA	voltage 2.7V~3.6V, current ≥500mA	voltage 2.7V~3.6V, current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃, ＜90%RH	-40℃~+125℃, ＜90%RH	-40℃~+125℃, ＜90%RH
IO	9	15	9
Rate	Default 115200bps	Default 115200bps	Default 115200bps
Security	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3
Flash	Default 4MByte, Supported Expansion	Default 4MByte, Supported Expansion	Default 4MByte, Supported Expansion
Certification	CE/FCC/KCC/NCC/SRRC/REACH/ RoHS/BQB/TELEC	CE/FCC/KCC/NCC/SRRC/REACH/RoHS/BQB	CE/FCC/KCC/SRRC/REACH/RoHS/BQB
Application	Internet of Things (IoT), Mobile devices, Wearable electronic devices, Smart home and other sectors		

Ai-WB2 series module is a WiFi+ Bluetooth module developed by Ai-Thinker. Bluetooth low power 5.0, BLE Mesh; Support multiple sleep modes, deep sleep current 12μA.

	Ai-WB2 series	
Model	Ai-WB2-13U	Ai-WB2-07S
Picture		
Package	SMD-18	SMD-16
Size	14.0*18.0*3.1 (±0.2) mm	17.0*16.0*3.1(±0.2)mm
Antenna	External IPEX	IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	BL602	BL602
Characteristics	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh
power supply	voltage 2.7V~3.6V, current≥500mA	voltage2.7V~3.6V, current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃, ＜90%RH	-40℃~+125℃, ＜90%RH
IO	9	9
Rate	Default 115200bps	Default 115200bps
Security	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3
Flash	Default 4MByte, Supported Expansion	Default 4MByte, Supported Expansion
Certification	CE/FCC/KCC/SRRC/REACH/RoHS/BQB	CE/FCC/KCC/SRRC/REACH/RoHS/BQB
Application	Internet of Things (IoT), Mobile devices, Wearable electronic devices, Smart home and other sectors	

Ai-WB2 series module is a WiFi+ Bluetooth module developed by Ai-Thinker. Bluetooth low power 5.0, BLE Mesh; Support multiple sleep modes, deep sleep current 12μA.

Ai-WB2 series		
Model	Ai-WB2-12S	Ai-WB2-01M
Picture		
Package	SMD-16	DIP-18
Size	24.0*16.0*3.1(±0.2)mm	18.0*18.0*2.8(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	BL602	BL602
Characteristics	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh
power supply	voltage 2.7V~3.6V，current ≥500mA	voltage2.7V~3.6V，current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	9	14
Rate	Default 115200bps	Default 115200bps
Security	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3
Flash	Default 4MByte，Supported Expansion	Default 2MByte，Supported Expansion
Certification	CE/FCC/KCC/SRRC/REACH/ RoHS/BQB/TELEC	CE/FCC/KCC/SRRC/REACH/RoHS/BQB
Application	Internet of Things (IoT), Mobile devices, Wearable electronic devices, Smart home and other sectors	

Ai-WB2 series development board is based on Ai-WB2 series modules.Ai-WB2 series module is a WiFi+ Bluetooth module developed by Ai-Thinker. Bluetooth low power 5.0, BLE Mesh; Support multiple sleep modes, deep sleep current 12μA.

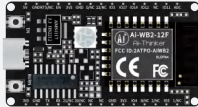| Ai-WB2 series		
Model	Ai-WB2-12F-Kit	Ai-WB2-32S-Kit	Ai-WB2-13-Kit
Picture			
Model	Ai-WB2-12F	Ai-WB2-32S	Ai-WB2-13
Package	DIP-30(2.54 spacing standard pin header)	DIP-38(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)
Size	49.66*25.40(±0.2)mm	55.05*25.40(±0.2)mm	49.66*25.40(±0.2)mm
Antenna	On board antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	BL602	BL602	BL602
power supply	voltage：3V3 or 5V，current ≥500mA	voltage：3V3 or 5V，current ≥500mA	voltage：3V3 or5V，current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	15	15	11
Rate	Default 115200bps	Default 115200bps	Default 115200bps
Security	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3
Flash	Default 4MByte	Default 4MByte	Default 4MByte
Application	Use in development phase		

WiFi+Bluetooth products Ai-WB2 series

Ai-WB2 series module is a WiFi+ Bluetooth module developed by Ai-Thinker. Bluetooth low power 5.0, BLE Mesh; Support multiple sleep modes, deep sleep current 12μA.

Ai-WB2 series			
Model	Ai-WB2-M1	Ai-WB2-M1-I	Ai-WB2-01S
Picture			
Package	SMD-61	SMD-61	DIP-8
Size	16.6*13.2*2.4(±0.2)mm	12.5*13.2*2.4(±0.2)mm	14.5*24.5*11.2(±0.2)mm
Antenna	On board antenna	IPEX	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	BL602	BL602	BL602
Characteristics	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh	Bluetooth 5.0, BLE Mesh
power supply	voltage 2.7V~3.6V，current ≥500mA	voltage 2.7V~3.6V，current ≥500mA	voltage 2.7V~3.6V，current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM/I2C/SPI	UART/GPIO/ADC/PWM
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	15	15	3
Rate	Default 115200bps	Default 115200bps	Default 115200bps
Security	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3	WPS/WEP/WPA/WPA2 Personal /WPA2 Enterprise/WPA3
Flash	Default 4MByte	Default 4MByte	Default 2MByte，Supported Expansion
Certification	CE/FCC/KCC/SRRC/REACH/RoHS/BQB	CE/FCC/KCC/SRRC/REACH/RoHS/BQB	CE/FCC/KCC/SRRC/REACH/RoHS/BQB
Application	Internet of Things (IoT), Mobile devices, Wearable electronic devices, Smart home and other sectors		

WiFi+Bluetooth products Ai-WB1 series

Ai-WB1 series module is a WiFi& Bluetooth module developed by Ai-Thinker. It supports a variety of sleep modes and the standby power consumption current is 20

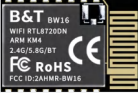| Ai-WB1series			
Model	Ai-WB1-12F	Ai-WB1-32S	Ai-WB1-A1S
Picture			
Package	SMD-22	SMD-38	SMD-38
Size	24.0*16.0*3.1(±0.2)mm	25.5*18.0*3.1(±0.2)mm	31.5*19.0*3.1(±0.2)mm
Antenna	On board antenna	On board antenna/IPEX	On board antenna/IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	W800	W800	云知声-US615U6+ES8311
Characteristics	Support Bluetooth 4.2 protocol	Support Bluetooth 4.2 protocol	Wi-Fi&BLE4.2 module, integrated with ES8311 speech codec chip
power supply	voltage 3.0V~3.6V，current ≥500mA	voltage 3.0V~3.6V，current ≥500mA	voltage 3.0V~3.6V，current ≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI/ Touchsenser/PSRAM/SDIO/DuplexI2S	UART/GPIO/ADC/PWM/I2C/SPI/ Touchsenser/PSRAM/SDIO/DuplexI2S	UART/GPIO/ADC/PWM/I2C/SPI/Touchsenser/ PSRAM/SDIO/DuplexI2S/Microphone/speaker
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	18	18	11
Rate	Default 115200bps	Default 115200bps	Default 115200bps
Security	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS
Flash	Default 2MByte	Default 2MByte	Default 2MByte，MAX 16MByte
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS
Application	Internet of Things (IoT), Mobile devices, Wearable electronic devices, Smart home and other sectors		

WiFi+Bluetooth products Ai-WB1 series

Ai-WB1 series development board is based on Ai-WB1 series modules.It is a WiFi& Bluetooth module developed by Ai-Thinker. It supports a variety of sleep modes and the standby power consumption current is 20µA.

Ai-WB1series		
Model	Ai-WB1-12F-Kit	Ai-WB1-32S-Kit	Ai-WB1-32S-CAM
Picture			
Model	Ai-WB1-12F	Ai-WB1-32S	Ai-WB1-32S
Package	DIP-30(2.54 spacing standard pin header)	DIP-38(2.54 spacing standard pin header)	DIP-16
Size	25.4*55.19(±0.2)mm	25.40*55.78(±0.2)mm	40.01*27.01(±0.2)mm
Antenna	On board antenna	On board antenna/IPEX	On board antenna/IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	W800	W800	W800
Characteristics	Support Bluetooth 4.2 protocol	Support Bluetooth 4.2 protocol	Ai-WB1-32S module + GC032A camera development board
power supply	Type-C voltage：5.0V，Pin row power supply 3V3 or 5V，current > 500mA	Type-C voltage：5.0V，Pin row power supply 3V3 or 5V，current > 500mA	voltage 3V3 or 5V，current≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI/Duplex I2S/SDIO	UART/GPIO/ADC/PWM/I2C/SPI/DuplexI2S/SDIO	UART
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	18	18	2
Rate	Support 110~2000000bps，Default 115200bps	Support 110~2000000bps，Default 115200bps	Support 110~2000000bps，Default 115200bps
Security	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS	Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS
Flash	Default 2MByte	Default 2MByte	Default 2MByte
Application	Use in development phase		

WiFi+Bluetooth products RTL8720 series

BW15 and BW16 support 2.4G WiFi and BLE4.2, among which BW16 is a dual-band module that can support 2.4GHz or 5GHz WiFi.

	RTL8720CF series	RTL8720DN series
Model	BW15	BW16
Picture		
Package	SMD-16	SMD-16
Size	24.0*16.0*3.1(±0.2)mm	24.0*16.0*3.0(±0.2)mm
Antenna	On board antenna/IPEX	On board antenna/IPEX
Frequency	2400~2483.5MHz	2400~2483.5MHz/5180~5825MHz
Chip	RTL8720CF	RTL8720DN
Characteristics	2.4GWiFi+BLE4.2	Dual Band WiFi+BLE5.0
Bluetooth	BLE4.2	BLE5.0
Bluetooth frequency	2400~2483.5MHz	2400~2483.5MHz
power supply	voltage：3.0V~3.6V、current > 500mA	voltage：3.0V~3.6V、Typical 3V3、current > 500mA
Interface	UART/GPIO/PWM/IIC/SPI/ADC	UART/GPIO/PWM/IIC/SPI/ADC/SWD
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Flash	Built-in 2MB	Default 2MB
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS/TELEC/KCC/IC/NCC
Application	Smart home, Smart lighting, Smart switch, Smart socket, Security monitoring	

WiFi+Bluetooth products RTL8720 series

The BW15-Kit and BW16-Kit continue the classic design of the NodeMCU development board by directing all IO ports to the pins on both sides and allowing developers to connect peripherals as they see fit.

	RTL8720CF series	RTL8720DN series
Model	BW15-Kit	BW16-Kit
Picture		
Package	DIP-30(2.54 spacing standard pin header)	DIP-22(2.54 spacing standard pin header)
Size	25.4*49.0*3.0(±0.2)mm	25.4*49.0*3.0(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400~2483.5MHz	2400~2483.5MHz/5180~5825MHz
Chip	RTL8720CF	RTL8720DN
Characteristics	2.4GWiFi+BLE4.2	Dual Band WiFi+BLE5.0
Bluetooth	BLE4.2	BLE5.0
Bluetooth frequency	2400~2483.5MHz	2400~2483.5MHz
power supply	Micro USB voltage：5V，voltage：3.0V~3.6V，current＞500mA	Type-C voltage：5V，voltage：3.0V~3.6V，current＞500mA
Interface	UART/GPIO/PWM/IIC/SPI/ADC	UART/GPIO/PWM/IIC/SPI/ADC/SWD
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Flash	Built-in 2MB	Default 2MB
Application	Use in development phase	

WiFi+Bluetooth products TG series

Both TG-01M and TG-12F modules are based on the module developed by Tmall Genie TG7100C WiFi+BLE chip. They are designed with 2.4G frequency band, WiFi 802.11b/g/n and BLE5.0 baseband /MAC, and can customize SDK, which can help terminal products pass the Tmall Genie certification.

	TG series	
Model	TG-01M	TG-12F
Picture		
Package	DIP-18/SMD-15	SMD-22
Size	18.0*18.0*2.8(±0.2)mm	24.0*16.0*3.0(±0.2)mm
Antenna	On board antenna	On board antenna/IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Tmall TG7100C	Tmall TG7100C
Characteristics	WiFi 802.11b/g/n and BLE 5.0 , Can customize SDK, support secondary development	WiFi 802.11b/g/n and BLE 5.0 , Can customize SDK, support secondary development
power supply	voltage：3.0V~3.6V、current＞500mA	voltage：3.0V~3.6V、current＞500mA
Interface	SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO	SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Support 110~4608000bps，Default 115200bps	Support 110~4608000bps，Default 115200bps
SPI Flash	2MB	2MB
Security	AES/SHA/PKA	AES/SHA/PKA
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS/Tmall Genie
Application	Smart home appliances, Smart lighting, Smart switch, Smart socket, Smart clothes rack, Tmall genie application	

WiFi+Bluetooth products TG series

TG-01M-Kit and TG-12F-Kit development boards are based on TG-01M and TG-12F modules, with a total of 5 channels of PWM. All modules can be drawn by IO to row pins, which is convenient for developers to develop and debug.

TG series		
Model	TG-01M-Kit	TG-12F-Kit
Picture		
Model	TG-01M	TG-12F
Package	DIP-20(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)
Size	32.4*28.6*18.0(±0.2)mm	48.0*25.0*14.0(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Tmall TG7100C	Tmall TG7100C
power supply	Micro USB voltage：4.75V~5.25V，Recommend 5V current：＞500mA	Micro USB voltage：4.75V~5.25V，Recommend 5V current：＞500mA
Output Power	MAX:+20dBm	MAX:+20dBm
Rx sensitivity	Typical:-97dBm	Typical:-97dBm
Interface	SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO	SDIO/SPI/UART/I2C/IR remote/PWM/ADC/DAC/PIR/GPIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Support 110~4608000bps、Default 115200bps	Support 110~4608000bps、Default 115200bps
SPI Flash	2MB	2MB
Certification	AES/SHA/PKA	AES/SHA/PKA
Application	Use in development phase	

WiFi+Bluetooth Gateway

WiFi+Bluetooth family intelligent gateway ESP32-G, through which the system information collection, information input, information output, centralized control, remote control and linkage control and other functions. Supports Smart Config/AirKiss one-click network configuration.

WiFi+Bluetooth Gateway Series	
Model	ESP32-G
Picture	
Size	118*79*26(±0.2)mm
Frequency	Wi-Fi Frequency：2400~2483.5MHz
Bluetooth	BLE Mesh
Networking way	Ethernet /Wi-Fi
Operating temperature	-20℃~+40℃
Storage environment	-40℃~+85℃
power supply	voltage：DC5~12V(Suggestion 12V)，current：1A
Power Consumption	＜1.5W
Protection	IP66（Standard configuration is suitable for indoor use only）
Shell material	plastic shell
Indicator	Power indicator, LAN status indicator, WiFi status indicator and network connection indicator
key	Hardware reset and restore factory Settings button
Ethernet	10/100M WAN
WiFi	802.11b/g/n
Certification	SRRC/REACH/RoHS
Application	Automatic meter reading, Home building automation, Security system, Remote irrigation system

WiFi product Hi series

Hi series module is the 2.4G Wi-Fi module developed by Ai-Thinker，Access to Harmony OS; The built-in SRAM is 352KB, the ROM is 288KB, and the Flash is 2MB.

Hi series		
Model	Hi-07S	Hi-07SL
Picture		
Package	SMD-22	SMD-22
Size	17.0*16.0*3.2(±0.2)mm	17.0*16.0*3.2(±0.2)mm
Antenna	IPEX	IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Hi3861	Hi3861L
Characteristics	Highly integrated 2.4GHz low-power SoC WiFi chip	Highly integrated 2.4GHz low-power SoC WiFi chip，260μA@DTIM10
Supply voltage	voltage：3.0V~3.6V	voltage：3.0V~3.6V
Supply current	current＞500mA	current＞500mA
Interface	UART/SPI/I2C/GPIO/ADC/PWM/I2S/SDIO	UART/SPI/I2C/GPIO/ADC/PWM/I2S/SDIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Default 115200	Default 115200
WiFi	802.11b/g/n	802.11b/g/n
Security	WFA WPA/WPA2 personal、WPS2.0	WFA WPA/WPA2 personal、WPS2.0
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS
Application	Smart home, Smart security, Smart city and other IOT related smart terminal products	

WiFi product Hi series

Hi series development board is based on Hi series modules. Integrated high performance 32bit microprocessor, hardware security engine and rich peripheral interface for developers.

Hi series		
Model	Hi-07S-Kit	Hi-07SL-Kit
Picture		
Model	Hi-07S	Hi-07SL
Package	DIP-30(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)
Size	25.40*48.26(±0.2)mm	25.40*48.26(±0.2)mm
Antenna	IPEX	IPEX
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Hi3861	Hi3861L
Supply voltage	Micro USB voltage：5.0V，voltage 3V3 current：＞500mA	Micro USB voltage：5.0V，voltage 3V3 current：＞500mA
Interface	PWM/SPI/GPIO/ADC/UART/I2C/I2S/SDIO	PWM/SPI/GPIO/ADC/UART/I2C/I2S/SDIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
IO	15，contain TX0/RX0 TX1/RX1	13，contain TX0/RX0 TX1/RX1
Rate	Default 115200	Default 115200
Security	WFA WPA/WPA2 personal、WPS2.0	WFA WPA/WPA2 personal、WPS2.0
Flash	2MB Flash	2MB Flash
WiFi	802.11b/g/n	802.11b/g/n
Application	Use in development phase	

WiFi product Hi series

Hi series module is the 2.4G Wi-Fi module developed by Ai-Thinker，Access to Harmony OS; The built-in SRAM is 352KB, the ROM is 288KB, and the Flash is 2MB.

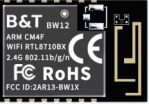| Hi series		
Model	Hi-12F	Hi-12FL
Picture		
Package	SMD-22	SMD-22
Size	24.0*16.0*3.2（±0.2）mm	24.0*16.0*3.2(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Hi3861	Hi3861L
Characteristics	Highly integrated 2.4GHz low-power SoC WiFi chip	Highly integrated 2.4GHz low-power SoC WiFi chip，260μA@DTIM10
Supply voltage	Voltage：3.0V~3.6V	Voltage：3.0V~3.6V
Supply current	Current > 500mA	Current > 500mA
Interface	UART/SPI/I2C/GPIO/ADC/PWM/I2S/SDIO	UART/SPI/I2C/GPIO/ADC/PWM/I2S/SDIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，< 90%RH	-40℃~+125℃，< 90%RH
Rate	Default 115200	Default115200
WiFi	802.11b/g/n	802.11b/g/n
Security	WFA WPA/WPA2 personal、WPS2.0	WFA WPA/WPA2 personal、WPS2.0
Certification	CE/FCC/SRRC/REACH/RoHS/ HarmonyOS Connect-S	CE/FCC/SRRC/REACH/RoHS
Application	Smart home, Smart security, Smart city and other IOT related smart terminal products	

WiFi product Hi series

Hi series development board is based on Hi series modules. Integrated high performance 32bit microprocessor, hardware security engine and rich peripheral interface for developers.

Hi series		
Model	Hi-12F-Kit	Hi-12FL-Kit
Picture		
Model	Hi-12F	Hi-12FL
Package	DIP-30(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)
Size	25.40*48.26(±0.2)mm	25.40*48.26(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	Hi3861	Hi3861L
Supply voltage	Micro USB voltage：5.0V，voltage 3V3 current：> 500mA	Micro USB voltage：5.0V，voltage 3V3 current：> 500mA
Interface	PWM/SPI/GPIO/ADC/UART/I2C/I2S/SDIO	PWM/SPI/GPIO/ADC/UART/I2C/I2S/SDIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，< 90%RH	-40℃~+125℃，< 90%RH
IO	15，contain TX0/RX0 TX1/RX1	13，contain TX0/RX0 TX1/RX1
Rate	Default 115200	Default 115200
Security	WFA WPA/WPA2 personal、WPS2.0	WFA WPA/WPA2 personal、WPS2.0
Flash	2MB Flash	2MB Flash
WiFi	802.11b/g/n	802.11b/g/n
Application	Use in development phase	

WiFi product RTL8710BX series

BW12 and BW14 are highly integrated Wi-Fi SoC modules. This series of modules has built-in WiFi protocol with full functions. Provides simple application development examples.

RTL8710BX series		
Model	BW12	BW14
Picture		
Package	SMD-16	*
Size	24.0*16.0*3.1(±0.2)mm	50.5*29.2*3.3(±0.2)mm
Antenna	On board antenna/IPEX	On board antenna/IPEX
Frequency	2400~2483.5MHz	2400~2483.5MHz
Chip	RTL8710BX	RTL8710BX
Supply voltage	3.3~3.6V	5V~12V
Interface	UART/SPI/I2C/GPIO/SWD/PWM	UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Default 115200	Default 115200
WiFi	802.11b/g/n	802.11b/g/n
Security	WPA/WPA2	WPA/WPA2
Certification	CE/FCC/SRRC/REACH/RoHS	REACH/RoHS
Application	Household appliances, Home automation, Hmart socket, Smart lights, Industrial wireless control	Household appliances, Home automation, Intelligent socket, Intelligent lamp, Industrial wireless control, Intelligent transformation of household appliances

PB-03 series is a Bluetooth module developed by Shenzhen Ai-Thinker Technology Co.,Ltd.Bluetooth low power BLE5.2, BLE Mesh; Supports serial port local upgrade and remote firmware upgrade (FOTA). The default serial port rate is 115200bps.

PB series			
Model	PB-03	PB-03F	PB-03M
Picture			
Package	SMD-61	SMD-22	DIP-18
Size	16.6*13.2*2.8（±0.2）mm	24.0*16.0*3.1(±0.2)mm	18.0*18.0*2.8(±0.2)mm
Antenna	On board antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	PHY6252(SSOP24)	PHY6252(SSOP24)	PHY6252(SSOP24)
Characteristics	BLE 5.2，Support mesh	BLE 5.2，Support mesh	BLE 5.2，Support mesh
Power Supply	voltage：2.7V~3.6V，current＞200mA	voltage：2.7V~3.6V，current＞200mA	voltage：2.7V~3.6V，current＞200mA
IO	19	19	15
Security	AES-128	AES-128	AES-128
Flash	256KB	256KB	256KB
Interface	UART/GPIO/ADC/PWM/I2C/I2S/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/I2S/SPI/PWM/DMA
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Output Power	MAX+10dBm	MAX+10dBm	MAX+10dBm
Receiving sensitivity	Typical:-96dBm	Typical:-96dBm	Typical:-96dBm
Power consumption	Deep sleep：7.2μA、Power Off：0.57μA RX model：9.4mA，TX model(0dBm)：11.5mA	Deep sleep：7.2μA、Power Off：0.57μA RX model：9.4mA，TX model(0dBm)：11.5mA	Deep sleep：7.2μA、Power Off：0.57μA RX model：9.4mA，TX model(0dBm)：11.5mA
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS
Application	Smart lights, Switches, Sockets, Wearable devices, Smart locks		

PB-03 series development board is based on PB-03 series module, which supports low power consumption BLE5.2, BLE Mesh; Supports serial port local upgrade and remote firmware upgrade (FOTA). The default serial port rate is 115200bps.

PB series			
Model	PB-03-Kit	PB-03F-Kit	PB-03M-Kit
Picture			
Model	PB-03	PB-03F	PB-03M
Package	DIP-30(2.54 spacing standard pin header)	DIP-30(2.54 spacing standard pin header)	DIP-20(2.54 spacing standard pin header)
Size	48.3*25.5(±0.2)mm	48.3*25.0*3.0(±0.2)mm	31.30*28.40(±0.2)mm
Antenna	On board antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Characteristics	PHY6252	PHY6252	PHY6252
Power Supply	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：2.7V~3.6V，current：＞200mA，Recommend 3V3	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：2.7V~3.6V，current：＞200mA，Recommend 3V3	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：3.0V~3.6V，current：＞200mA，Recommend 3V3
Security	AES-128	AES-128	AES-128
Flash	256KB	256KB	256KB
Interface	UART/GPIO/ADC/DMA/I2C/I2S/SPI/PWM/PDM	UART/GPIO/ADC/DMA/I2C/I2S/SPI/PWM/PDM	UART/GPIO/ADC/DMA/I2C/I2S/SPI/PWM/PDM
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Output Power	MAX+10dBm	MAX+10dBm	MAX+10dBm
Receiving sensitivity	Typical:-96dBm	Typical:-96dBm	Typical:-96dBm
Power consumption	Sleep model：7.2μA、Power Off：0.57mA、Launch mode（TX:8dBm）:11.5mA	Sleep model：7.2μA、Power Off：0.57μA、Launch mode（TX:8dBm）:11.5mA	Sleep model：7.2μA、Power Off：0.57μA、Launch mode（TX:10dBm）:11.5mA
Application	Use in development phase		

Bluetooth Product TB Series

TB series module is a Bluetooth module developed by Shenzhen Ai-Thinker Technology Co.,Ltd.which supports BLE Mesh. TB-02 and TB-03F can be directly controlled by Tmall Genie without gateway; TB-02 has the function of small night light.

TB series		
Model	TB-02	TB-03F
Picture		
Package	DIP-18/SMD-13	SMD-22
Size	18.0*18.0*2.8(±0.2)mm	24.0*16.0*3.0（±0.2）mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	TLSR8250F512	TLSR8250F512
Characteristics	BLE 5.0, Mesh networking，Support for direct control of Tmall genie	BLE 5.0, Mesh networking，Support for direct control of Tmall genie
Power Supply	voltage：2.7V~3.6V，current≥50mA	voltage：2.7V~3.6V，current≥50mA
Interface	GPIO/PWM/SPI/ADC/UART	GPIO/PWM/SPI/ADC/I2S/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Output Power	MAX+10dBm	MAX+10dBm
Test distance (Open space outside)	80-150m	80-150m
Power consumption	Deep sleep：0.8μA、standby mode：3.06mA TX mode（10dBm）：22.24mA	Deep sleep：0.4μA、standby mode：2.51mA TX mode（10dBm）：20.54mA
Certification	CE/FCC/SRRC/REACH/RoHS/Tencent Cloud/Tmall genie	CE/FCC/SRRC/REACH/RoHS
Application	Smart lights, Smart sockets, Smart switches, Smart clothes racks, etc	

Bluetooth Product TB Series

TB series module is a Bluetooth module developed by Shenzhen Ai-Thinker Technology Co.,Ltd.with a small night light function, with a wall switch to change the color temperature function.

TB series		
Model	TB-04	TB-05
Picture		
Package	SMD-20	SMD-20
Size	12.2*13.0*2.3(±0.2)mm	12.2*18.6*2.8(±0.2)mm
Antenna	Through hole pad/compatible half hole pad	On board antenna/through hole pad/compatible half hole pad
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	TLSR8250F512	TLSR8250F12
Characteristics	BLE 5.0, Mesh networking，Support for direct control of Tmall genie	BLE 5.0, Mesh networking，Support for direct control of Tmall genie
Power Supply	voltage：2.7V~3.6V，current≥50mA	voltage：2.7V~3.6V，current≥50mA
Interface	GPIO/PWM/SPI/ADC/UART	GPIO/PWM/SPI/ADC/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Output Power	MAX+10dBm	MAX+10.5dBm
Test distance (Open space outside)	80-150m	≥100m
Power consumption	Deep sleep：0.8μA、standby mode：3.06mA TX mode（10dBm）：20.69mA	Deep sleep：0.8μA、standby mode：1.8μA TX mode（10.5dBm）：21.56mA
Certification	CE/FCC/SRRC/REACH/RoHS/Tencent Cloud	CE/FCC/SRRC/REACH/RoHS/Tencent Cloud
Application	Smart lights, Smart sockets, Smart switches, Smart clothes racks, etc	

Bluetooth Product TB Series

TB series development board is based on this series module. The series development board has a total of 5 channels PWM, can adjust RGB seven color lights and two channels of heating and cooling lights; Support Tmall genie direct connection, support Android /ioS APP and wechat small program control; The UART interface supports firmware burning.

TB series		
Model	TB-02-Kit(patch)	TB-02-Kit(DIP)
Picture		
Model	TB-02	TB-02
Package	DIP-16(2.54 spacing standard pin header)	DIP-20(2.54 spacing standard pin header)
Size	30.0*40.0(±0.2)mm	32.3*28.7*18.0(±0.2)mm
Antenna	On board antenna	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Bluetooth	BLE5.0，Support mesh	BLE5.0，Support mesh
Flash	built-in 512KByte	built-in 512KByte
Power Supply	Micro USB voltage：4.7V~5.25V，Recommend 5V；Peak current over 100mA	Micro USB voltage：4.7V~5.25V，Recommend 5V；Peak current over 100mA
Interface	PWM/GPIO/ADC/I2C/UART	PWM/GPIO/ADC/I2C/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Output Power	MAX+10dBm	MAX+10dBm
Power consumption	Sleep Mode：0.8μA，standby mode:3mA Full-load mode(TX:10dBm)：23mA	Sleep Mode：0.8μA，standby mode:3mA Full-load mode(TX:10dBm)：23mA
Application	Use in development phase	

Bluetooth Product TB Series

TB series development board is based on this series module. The series development board has a total of 5 channels PWM, can adjust RGB seven color lights and two channels of heating and cooling lights; Support Tmall genie direct connection, support Android /ioS APP and wechat small program control; The UART interface supports firmware burning.

TB series		
Model	TB-03F-Kit	TB-04-Kit
Picture		
Model	TB-03F	TB-04
Package	DIP-30(2.54 spacing standard pin header)	DIP-20(2.54 spacing standard pin header)
Size	25.40*48.26(±0.2)mm	30*40(±0.2)mm
Antenna	On board antenna	IPEX /Compatible with half-hole pad
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Bluetooth	BLE5.0, Support mesh	BLE5.0, Support mesh
Flash	built-in 512KByte	built-in 512KByte
Power Supply	Micro USB voltage：4.7V~5.25V，Recommend 5V；Peak current over 100mA	Micro USB voltage：4.7V~5.25V，Recommend 5V；Peak current over 100mA
Interface	PWM/GPIO/ADC/I2C/UART	PWM/GPIO/ADC/I2C/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Output Power	MAX+10dBm	MAX+10dBm
Power consumption	Sleep Mode：0.4μA，standby mode:2.51mA Full-load modeTX:10dBm)：20.54mA	Sleep Mode：0.8μA，standby mode:3mA Full-load mode(TX:10dBm)：23mA
Application	Use in development phase	

TG-02 series module is a Bluetooth module developed by Shenzhen Anxin Technology, which supports BLE5.1 and BLE Mesh. Support secondary development; General AT command can quickly get started; Support multiple dormancy modes, deep sleep current is less than 15μA; Access to Tmall Genie, Amazon Echo.

TG series			
Model	TG-02	TG-02F	TG-02M
Picture			
Package	SMD-20	SMD-22	DIP-18 Goldfinger plug-in
Size	18.6*12.2*2.8(±0.2)mm	24.0*16.0*2.8(±0.2)mm	18.0*18.0*2.8(±0.2)mm
Antenna	Default On board antenna，Optional external spring antenna	On board antenna	On board antenna
Frequency	2400 ~ 2483.5MHz	2400 ~ 2483.5MHz	2400 ~ 2483.5MHz
Chip	TG7120B(SOP16)	TG7120B(SOP16)	TG7120B(SOP16)
Characteristics	BLE 5.1，BLE Mesh	BLE 5.1，BLE Mesh	BLE 5.1，BLE Mesh
Power Supply	voltage：2.7V~3.6V，current≥200mA	voltage：2.7V~3.6V，current≥200mA	voltage：2.7V~3.6V，current≥200mA
Operating temperature	-40℃~85℃（Normal temperature）-40 ℃~ 105℃ (High temperature)	-40℃~85℃（Normal temperature）-40 ℃~ 105℃ (High temperature)	-40℃~85℃（Normal temperature）-40 ℃~ 105℃ (High temperature)
Storage environment	-40℃~125℃，＜90%RH	-40℃~125℃，＜90%RH	-40℃~125℃，＜90%RH
Interface	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA
IO	11	11	11
Rate	Default 115200bps	Default 115200bps	Default 115200bps
Bluetooth	BLE5.1	BLE5.1	BLE5.1
security	AES-128	AES-128	AES-128
Flash	512KB	512KB	512KB
Certification	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS	CE/FCC/SRRC/REACH/RoHS
Application	Smart lights, Switch sockets, Smart clothes racks, Wearable electronic devices		

TG-02 series development board is based on TG-02 series module, which supports BLE5.1, BLE Mesh; Support secondary development; General AT command can quickly get started; Support multiple sleep modes, deep sleep current is less than 15μA.

TG series			
Model	TG-02-Kit	TG-02F-Kit	TG-02M-Kit
Picture			
Model	TG-02	TG-02F	TG-02M
Package	DIP-19（2.54 spacing standard pin header)	DIP-30 (2.54 spacing standard pin header)	DIP-20(2.54 spacing standard pin header)
Size	45.54*29.93（±0.2）mm	49.66*25.40（±0.2mm）	37.73*28.45（±0.2mm）
Antenna	On board antenna	On board antenna	On board antenna
Frequency	2400 ~ 2483.5MHz	2400 ~ 2483.5MHz	2400 ~ 2483.5MHz
Power Supply	USB voltage：5V、Pin row power supply：3V3 or 5V current≥200mA	USB voltage：5V、Pin row power supply：3V3 or 5V current≥200mA	USB voltage：5V、Pin row power supply：3V3 current≥200mA
Operating temperature	-40 ℃~ 85℃	-40 ℃~ 85℃	-40 ℃~ 85℃
Storage environment	-40℃~125℃，＜90%RH	-40℃~125℃，＜90%RH	-40℃~125℃，＜90%RH
Interface	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA	UART/GPIO/ADC/PWM/I2C/SPI/PDM/DMA
IO	11	11	11
Rate	Default 115200 bps	Default 115200 bps	Default 115200 bps
Bluetooth	BLE5.1	BLE5.1	BLE5.1
security	AES-128	AES-128	AES-128
SPI Flash	512KB	512KB	512KB
Application	Use in development phase		

PB series module is a cost-effective Bluetooth module designed based on Tmall Genie TG7100B, which supports BLE5.0 and SIG-Mesh. 6-channel PWM output, and the output frequency is 1KHz; With small night light function and wall switch to switch color temperature function.

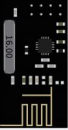| PB series		
Model	PB-01	PB-02
Picture		
Package	SMD-20	SMD-20
Size	12.2*13.0*2.3(±0.2)mm	12.2*18.6*2.3(±0.2)mm
Antenna	Half hole pad/Round hole pad	Half hole pad/Round hole pad / On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	TG7100B	TG7100B
Characteristics	BLE5.0, mesh networking，With a small night light function, free docking with the Tmall genie, Support Android/IOS APP and small program control	BLE5.0, mesh networking，With a small night light function, free docking with the Tmall genie, Support Android/IOS APP and small program control
Power Supply	voltage：2.7V~3.6V，current≥50mA	voltage：2.7V~3.6V，current≥50mA
Interface	GPIO/PWM/SPI/ADC/UART	GPIO/PWM/SPI/ADC/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Output Power	MAX+10dBm	MAX+10dBm
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Power consumption	Deep sleep：0.7μA（IO port wake up）Suspend Mode：2μA（RTC wake up）RX mode：7mA，TX mode(10dBm)：25mA	Deep sleep：0.7μA（IO port wake up）Suspend Mode：2μA（RTC wake up）RX mode：7mA，TX mode(10dBm)：25mA
Certification	CE/FCC/REACH/RoHS/Tencent Cloud/BQB	CE/FCC/SRRC/REACH/RoHS/Tencent Cloud/BQB/Tmall genie
Application	Smart lights, Smart wear, Retail payment and other iot fields	

PB series development board is based on PB series module, the series development board has 6 PWM output, can adjust RGB seven color lights and two heating and cooling lights; Module available IO port to row needle out, convenient for developers to develop their own debugging.

PB series		
Model	PB-01-Kit	PB-02-Kit
Picture		
Model	PB-01	PB-02
Package	DIP-20(2.54 spacing standard pin header)	DIP-20(2.54 spacing standard pin header)
Size	30.0*40.0(±0.2)mm	30.0*45.5(±0.2)mm
Antenna	IPEX	On board antenna
Frequency	2400MHz~2483.5MHz	2400MHz~2483.5MHz
Chip	TG7100B	TG7100B
Power Supply	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：3.0V~3.6V，current＞500mA，Recommend 3V3	Micro USB voltage：4.75V~5.25V，Recommend 5V voltage：3.0V~3.6V，current＞500mA，Recommend 3V3
Interface	PWM/SPI/GPIO/ADC/UART	PWM/SPI/GPIO/ADC/UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Output Power	MAX+10dBm	MAX+10dBm
Receiving sensitivity	Typical:-93dBm	Typical:-93dBm
Power consumption	Sleep Mode：0.7μA（IO port wake up）Standby mode：2μA（RTC wake up）Full-load mode（TX:10dBm）:25mA	Sleep Mode：0.7μA（IO port wake up）Standby mode：2μA（RTC wake up）Full-load mode（TX:10dBm）:25mA
Application	Use in development phase	

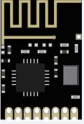# 2.4G Series

2.4G series module developed by Shenzhen Ai-Thinker Technology Co., LTD.Pure RF radio module, small size, low cost。

2.4G Series			
Module	NF-01-S	NF-01-N	NF-02-PA
Picture			
Package	DIP-8	DIP-8	DIP-8
Size	28.6*15.3(±0.2)mm	28.6*15.3(±0.2)mm	40.8*15.3(±0.2)mm
Antenna	On board antenna	On board antenna	SMA
Frequency	2400MHz-2525MHz	2400MHz-2525MHz	2400MHz-2525MHz
Chip	Si24R1	nRF24L01+	Si24R1
Supply voltage	1.9V~3.6V，Typical :3V3，current＞250mA	1.9V~3.6V，Typical :3V3，current＞250mA	1.9V~3.6V，Typical :3V3，current＞250mA
Standby current	15µA	26µA	26µA
Off current	0.7µA	0.9µA	0.9µA
Interface	SPI	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃	-40℃~+125℃	-40℃~+125℃
Transmitted Power（Max）	+7dBm	+0dBm	+20dBm
Rate	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps
Test distance (Open space outside)	240m	100m	1000m
Modulation mode	GFSK/FSK	GFSK	GFSK/FSK
Certification	REACH/RoHS	REACH/RoHS	REACH/RoHS
Application	Wireless mouse, Wireless remote control, Motion sensing equipment, Remote control toys		

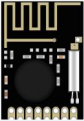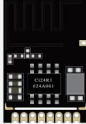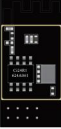# 2.4G Series

2.4G series module developed by Shenzhen Ai-Thinker Technology Co., LTD.Pure RF radio module, small size, low cost。

2.4G series			
Module	NF-02-PE	NF-03	NF-04
Picture			
Package	DIP-8	SMD-8	DIP-8
Size	40.8*15.3(±0.2)mm	18.0*12.0(±0.2)mm	28.6*15.3(±0.2)mm
Antenna	IPEX	On board antenna	On board antenna
Frequency	2400MHz-2525MHz	2400MHz-2525MHz	2400MHz-2525MHz
Chip	Si24R1	Si24R1	BK2425
Supply voltage	1.9V~3.6V，Typical 3V3，current＞250mA	1.9V~3.6V，Typical 3V3，current＞250mA	1.9V~3.6V，Typical3V3，current＞250mA
Standby current	26µA	15µA	50µA
Off current	0.9µA	0.7µA	3µA
Interface	SPI	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃	-40℃~+125℃	-40℃~+125℃
Transmitted Power（Max）	+20dBm	+7dBm	+4dBm
Rate	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps
Test distance (Open space outside)	1000m	240m	120m
Modulation mode	GFSK/FSK	GFSK/FSK	GFSK/FSK
Certification	REACH/RoHS	REACH/RoHS	REACH/RoHS
Application	Wireless mouse, Wireless remote control, Motion sensing equipment, Remote control toys		

2.4G series

2.4G series module developed by Shenzhen Ai-Thinker Technology Co., LTD.Pure RF radio module, small size, low cost。

2.4G series			
Module	NF-04-MI	NF-05	NF-05-S
Picture			
Package	SMD-8	SMD-8	DIP-8
Size	18.0*12.0(±0.2)mm	12.0*18.0(±0.2)mm	28.6*15.2(±0.2)mm
Antenna	On board antenna	On board antenna	On board antenna
Frequency	2400MHz-2525MHz	2400MHz-2525MHz	2400MHz-2525MHz
Chip	BK2425	Ci24R1	Ci24R1
Supply voltage	1.9V~3.6V，Typical 3V3，current＞250mA	2.1V~3.6V，Typical 3V3，current＞250mA	2.1V~3.6V，Typical 3V3，current＞250mA
Standby current	50μA	52.9μA	52.9μA
Off current	3μA	2μA	2μA
Interface	SPI	SPI	SPI
Operating temperature	-40℃~+85℃	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃	-40℃~+125℃	-40℃~+125℃
Transmitted Power（Max）	+4dBm	+8dBm	+8dBn
Rate	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps	250kbps/1Mbps/2Mbps
Test distance (Open space outside)	120m	240m	240m
Modulation mode	GFSK/FSK	GFSK/FSK	GFSK/FSK
Certification	REACH/RoHS	REACH/RoHS	REACH/RoHS
Application	Wireless mouse, Wireless remote control, Motion sensing equipment, Remote control toys		

GP-01/02high-performance BDS/GNSS multi-mode satellite navigation receiver SOC module，Support a variety of satellite navigation systems, including China's Beidou satellite navigation system BDS, the United States' GPS, and Russia's GLONASS, which can realize multi-system joint positioning

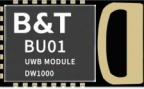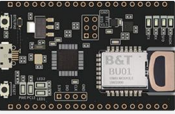| GPS Series		
Module	GP-01	GP-02
Picture		
Package	SMD-24	SMD-18
Size	16.2*12.2*2.4(±0.2)mm	10.3*9.9*2.4(±0.2)mm
Antenna	External antenna	External antenna
Chip	AT6558R	AT6558R
Characteristics	high-performance BDS/GNSS multi-mode satellite navigation receiver SOC module Support a variety of satellite navigation systems, including China's Beidou satellite navigation system BDS, the United States' GPS, and Russia's GLONASS, which can realize multi-system joint positioning	Super small volume，high-performance BDS/GNSS multi-mode satellite navigation receiver SOC module Support a variety of satellite navigation systems, including China's Beidou satellite navigation system BDS, the United States' GPS, and Russia's GLONASS, which can realize multi-system joint positioning
Supply voltage	2.7V~3.6V，typical 3V3	2.7V~3.6V，typical 3V3
Supply current	Supply current ≥30mA	Supply current ≥30mA
Interface	UART	UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
TTFF	Cold start：≤32S；Hot Start：≤1S	Cold start：≤32S；Hot Start：≤1S
Accuracy	Positioning accuracy＜2m(1σ)；Speed measurement accuracy＜0.1m/s(1σ)	Positioning accuracy＜2m(1σ)；Speed measurement accuracy＜0.1m/s(1σ)
Sensitivity	Cold start：-148dBm；Hot Start：-156dBm	Cold start：-148dBm；Hot Start：-156dBm
Rate	MAX 256000bps	MAX 256000bps
Power consumption	BDS/GPSdual-mode continuous operation：23mA、Sleep mode：20μA、Standby：8μA	BDS/GPSdual-mode continuous operation：23mA、Sleep mode：20μA、Standby：8μA
Certification	REACH/RoHS	REACH/RoHS
Application	Vehicle navigation, Intelligent wear, Unmanned aerial vehicle,Intelligent transportation	

GP-01-Kit/ GP-02-Kit based GP-01/GP-02 development board。The series development board is equipped with a ceramic antenna; Follow NMEA protocol, send instructions through serial communication to control the work of the development board

GPS Series		
Module	GP-01-Kit	GP-02-Kit
Picture		
Package	DIP-8	DIP-6
Size	26*24.1*2.4(±0.2)mm	20.3*18.0*3.1±0.2)mm
Antenna	Integrated GPS ceramic antenna integration	Integrated GPS ceramic antenna integration
Chip	AT6558R	AT6558R
Characteristics	high-performance BDS/GNSS multi-mode satellite navigation receiver SOC module Support a variety of satellite navigation systems, including China's Beidou satellite navigation system BDS, the United States' GPS, and Russia's GLONASS, which can realize multi-system joint positioning	Super small volume，high-performance BDS/GNSS multi-mode satellite navigation receiver SOC module Support a variety of satellite navigation systems, including China's Beidou satellite navigation system BDS, the United States' GPS, and Russia's GLONASS, which can realize multi-system joint positioning
Supply voltage	5V（USB 5V power supply is supported）	5V（5V power supply is supported）
Supply current	Supply current ≥30mA	Supply current≥30mA
Interface	UART	UART
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
TTFF	Cold start：≤32S；Hot Start：≤1S	Cold start：≤32S；Hot Start：≤1S
Accuracy	Positioning accuracy＜2m(1σ)；Speed measurement accuracy＜0.1m/s(1σ)	Positioning accuracy＜2m(1σ)；Speed measurement accuracy＜0.1m/s(1σ)
Sensitivity	Cold start：-148dBm；Hot Start：-156dBm	Cold start：-148dBm；Hot Start：-156dBm
Rate	MAX 256000bps	MAX 256000bps
Power consumption	BDS/GPSdual-mode continuous operation：23mA、Sleep mode：20μA、Standby：8μA	BDS/GPSdual-mode continuous operation：23mA、Sleep mode：20μA、Standby：8μA
Application	Use in development phase	

UWB series

BU01 is an ultra-wideband (UWB) transceiver module based on Decawave's DW1000 design. The module integrates antenna, RF circuit, power management and clock circuit; Can be used for a two-way ranging, positioning accuracy up to 10 cm, support up to 6.8 Mbps data rates.

UWB series		
Model	BU01	NodeMCU-BU01
Picture		
Package	SMD-24	DIP-40
Size	23.0*13.0*2.9(±0.2)mm	35.0*55.5（±0.2）mm
Antenna	On board antenna	On board antenna
Frequency	3.5GHz to 6.5GHz	3.5GHz to 6.5GHz
Chip	DW1000	DW1000+STM32F103C8
Characteristic	Without RF design, two-way ranging can be used	Without RF design, two-way ranging can be used
Supply voltage	voltage：2.8V~3.6V，Typical 3V3，current＞200mA	USB voltage：5V，Pin heade：3V3，current＞500mA
Interface	SPI	PWM/I2C/GPIO 、MCU All IO ports
Protocol Standards	IEEE 802.15.4-4011UWB	IEEE 802.15.4-4011UWB
Power consumption	Sleep power＜1mA	Development board bottom plate :160 mA (With MCU, sensor)
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	110Kbps/850Kbps/6.8Mbps	110Kbps/850Kbps/6.8Mbps
Position Accuracy	Up to 10 cm	Up to 10 cm
Application	Smart factory, Tunnel traffic, Warehousing logistics, Pavilion positioning, Parking lot	Use in development phase

4G series

The Ca-01 series is an ultra-compact package LTE cat.1bis module. Using the UIS8910 platform of Unigroup Group, support LTE 3GPP Rel.13 technology. It is a 4G full Netcom module that can be adapted to different operators and products, ensuring maximum flexibility in product design.

4G series		
Model	Ca-01	Ca-01-KitC
Picture		
Package	Stamp hole+LGA	Standard MiNi-PCIe
Size	24.0*24.0*2.3(±0.2)mm	51.0*30.0*3.3(±0.2)mm
Antenna	Half-hole pad	IPEX
Frequency	LTE-TDD:B34/B38/B39/B40/B41 LTE-FDD:B1/B3/B5/B8	LTE-TDD:B34/B38/B39/B40/B41 LTE-FDD:B1/B3/B5/B8
Characteristic	4G LTE full Netcom module	4G LTE full Netcom module
Supply voltage	3.3V~4.3V；Typical 3.8V	3.3V~4.3V；Typical 3.8V
Supply current	current ≥2A	current ＞2A
Interface	UART	MiNi-PCIe
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	Default 115200bps	Default 115200bps
Power consumption	Sleep mode：3mA Off mode：20μA	Sleep mode：3mA Off mode：20μA
Position	Base station location /WiFi location	Base station location /WiFi location
Certification	SRRC/CCC/REACH/RoHS/Network access permit	*
Application	CPE, Walkie-talkies, POS, Sharing devices, Data cards, Tablets, automobiles, Security, Industrial PDAs, etc	

GPRS series

A9 is a GSM/GPRS module, and A9G is a complete quad-band GSM/GPRS+GPS module. Their core chips cost less, making the overall solution more cost-effective. It is convenient for all kinds of Internet of Things hardware terminals.

GPRS series		
Model	A9	A9G
Picture		
Package	SMD-54	SMD-54
Size	19.2*18.8*2.7（±0.2）mm	19.2*18.8*2.7(±0.2)mm
Antenna	Half-hole pad	Half-hole pad
Frequency	850/900/1800/1900MHz	850/900/1800/1900MHz
Chip	RDA8955	RDA8955+GK9501S
Characteristic	Complete quad GSM/GPRS, supporting digital and analog audio, HR,FR,EFR,AMR voice encoding, voice calls and SMS messages	Complete quad GSM/GPRS+GPS/BDS, supporting digital and analog audio, HR,FR,EFR,AMR voice encoding, voice calls and SMS messages
Supply voltage	3.8V~4.2V，Typical 4V	3.8V~4.2V，Typical 4V
Supply current	Low power average current is lower than 2mA	Low power average current is lower than 2mA
Interface	I2C/UART/SDMMC/GPIO/ADC	I2C/USB/UART/SDMMC/GPIO/ADC
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage temperature	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Position Accuracy	*	Level：2.5m；Apeak：3.5m
Rate	2400~1843200bps，Default 115200bps	2400~1843200bps，Default 115200bps
Power consumption	1.14mA@DRX=5 1.03mA@DRX=9	1.14mA@DRX=5 1.03mA@DRX=9
Certification	CE/FCC/REACH/RoHS	CE/FCC/REACH/RoHS
Application	Smart wearables, Smart transportation, Home automation, Industrial wireless control, Wearable electronics, Wireless location-aware devices, Wireless positioning system signals, and other iot applications	

Offline Voice Module Series

Offline speech module is a low-cost pure offline speech recognition module, supporting bilingual control in Chinese and English. Support wake word self-learning without firmware compilation; The command words can be defined on the voice development platform of Essence for secondary development.

Offline Voice Module Series		
Module	VC-01	VC-02
Picture		
Package	SMD-24/DIP-24	SMD-20
Size	25.5*24*3.2(±0.2)mm	18.0*17.0*3.2(±0.2)mm
Chip	Voice Chip US516P6	Voice Chip US516P6
Secondary development	Support	Support
Comprehensive recognition rate	98%	98%
Recognition time	＜100ms	＜100ms
Power supply range	Voltage：3.6V~5V，current：＞500mA	Voltage：3.6V~5V，current＞500mA
Interface	UART/I2C/PWM/SPI/GPIO	UART/I2C/PWM/SPI/GPIO
IO	10	10
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	UART1 Default 115200 bps、UART0(IOB8) Default 57600bps	UART1Default 115200 bps、UART0(IOB8) Default 57600bps
Flash	2MB(Built-in)	2MB(Built-in)
Local command speech recognition	Article 150	Article 150
Certification	REACH/RoHS	REACH/RoHS
Application	Smart home, All kinds of smart small household appliances, 86 boxes, toys,Lamps and other products that need voice control	

Offline Voice Module Series

Based on the series module, the offline voice development board integrates the CH340C USB to TTL chip and provides the basic debugging interface and USB upgrade interface. The command words can be defined on the voice development platform of Essence for secondary development.

Offline Voice Module Series		
Module	VC-01-Kit	VC-02-Kit
Picture		
Package	DIP-19（2.54 spacing standard pin header）	DIP-19（2.54 spacing standard pin header）
Size	42.2*35.6 （±0.2）mm	42.2*35.6 （±0.2）mm
Chip	Voice Chip US516P6	Voice Chip US516P6
Secondary development	Support	Support
Comprehensive recognition rate	98%	98%
Recognition time	＜100ms	＜100ms
Power supply range	Voltage：5V，current ＞500mA	Voltage：5V，current ＞500mA
Interface	UART/I2C/PWM/DAC/GPIO	UART/I2C/PWM/DAC/GPIO
IO	5个GPIO	5个GPIO
Operating temperature	-40℃~+85℃	-40℃~+85℃
Storage environment	-40℃~+125℃，＜90%RH	-40℃~+125℃，＜90%RH
Rate	UART1 Default 115200 bps、UART0(IOB8) Default 57600bps	UART1 Default 115200 bps、UART0(IOB8) Default 57600bps
Flash	2MB(Built-in)	2MB(Built-in)
Local command speech recognition	Article 150	Article 150
Application	Use in development phase	

2.4G Antenna

The antenna is only for frequency 2.4G module。

The antenna with SMA connector should be used with connecting wire 。

2.4G series antenna			
External antenna			
Product	Foldable black rod antenna	Suction cup antenna - 1.5meters RG174line	Spring antenna
Picture			
Frequency	2400~2500MHz	2400~2500MHz	2400~2500MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤2.0	≤2.0	≤1.5
Gain	2.0dBi	2.0dBi	*
Connector	SMA	SMA/Tighten the non-rotatable	*
Length	109±4mm	199.5±3mm	12.1±0.5mm
Sustaining power	≥3kg	≥3kg	*
Coaxial cable	RG178 line	RG174 line	*
Line length	*	1.5m	*
Polarization mode	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~65℃	-30℃~65℃	-30℃~65℃
Storage temperature	-30℃~65℃	-30℃~65℃	-30℃~65℃
Module	WiFi Module、Bluetooth Module	WiFi Module、Bluetooth Module	WiFi Module、Bluetooth Module

2.4G series antenna		
Built-in antenna		
Product	Built-inFPC antenna（29.0*9.0mm）	Steel sheet antenna
Picture		
Frequency	2400~2500MHz	2400~2500MHz/5150~5850MHz
Input resistance	50Ω	50Ω
VSWR	≤2.0	≤2.0
Gain	2.0dBi	2.18dBi(2.4G)/4.33dBi(5.8G)
Connector	base	base
Length	*	200±3mm
Sustaining power	≥1kg	≥1kg
Coaxial cable	1.13 line	1.13 line
Line length	35-40mm以上	185±3mm
Polarization mode	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional
Operating temperature	-30℃~65℃	-30℃~65℃
Storage temperature	-30℃~65℃	-30℃~65℃
Module	WiFi Module、Bluetooth Module	WiFi Module、Bluetooth Module

433MHz Antenna

The antenna is only for frequency 433MHz module。

The antenna with SMA connector should be used with connecting wire 。

433MHz series antenna			
External antenna			
Product	Suction cup antenna - 5 meters RG174 line	Suction cup antenna - 1.5 meters RG174 line	Small pepper antenna (can'n foldable)
Picture			
Frequency	433MHz	433MHz	433MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤2.0	≤1.5	≤2.0
Connector	SMA	SMA/Tighten the non-rotatable	SMA/Tighten the non-rotatable
Length	184±3mm	182.5±3mm	42±2mm
Sustaining power	≥3kg	≥3kg	≥3kg
Coaxial cable	RG174 line	RG174 line	*
Line length	5m	1.5m	*
Polarization mode	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Module	LoRa/LoRaWAN/RF433	LoRa/LoRaWAN/RF433	LoRa/LoRaWAN/RF433

433MHz Antenna

The antenna is only for frequency 433MHz module。

The antenna with SMA connector should be used with connecting wire 。

433MHz series antenna		
Built-in antenna		
Product	Spring antenna	Spring antenna （Nickel Plated）
Picture		
Frequency	433MHz	420MHz~525MHz
Input resistance	50Ω	50Ω
VSWR	*	*
Connector	*	*
Length	54.3±0.6mm	46.3±0.8mm
Sustaining power	*	*
Coaxial cable	*	*
Line length	*	*
Polarization mode	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃
Module	LoRa/LoRaWAN/RF433	LoRa/LoRaWAN/RF433

470~510MHz Antenna

The antenna is only for frequency 470~510MHz module。

The antenna with SMA connector should be used with connecting wire 。

470~510MHz series antenna	
External antenna	
Product	Suction cup antenna - 1.5 meters RG174 line
Picture	
Frequency	470~510MHz
Input resistance	50Ω
VSWR	≤1.5
Gain	*
Connector	SMA/Tighten the non-rotatable
Length	147.5±3mm
Sustaining power	≥3kg
Coaxial cable	RG174 line
Line length	1.5m
Polarization mode	Linear polarization
Radiation direction	All-directional
Operating temperature	-30℃~+65℃
Storage temperature	-30℃~+65℃
Module	LoRa/LoRaWAN Module

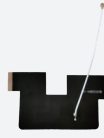## 868MHz Antenna

The antenna is only for frequency 868MHz module。

The antenna with SMA connector should be used with connecting wire 。

868MHz series antenna		
External antenna		Built-in antenna
Product	Black stick foldable integrated antenna	Suction cup antenna - 3 meters RG174 line	Spring antenna
Picture			
Frequency	868MHz	868MHz	868MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤2.0	≤1.5	≤1.5
Gain	-1.4dBi	*	*
Connector	SMA	SMA//Tighten the non-rotatable	*
Length	195±3mm	231.5±3mm	21.3±0.5mm
Sustaining power	≥3kg	≥3kg	*
Coaxial cable	*	RG174 line	*
Line length	*	3m	*
Polarization mode	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃

4G Antenna

The antenna is only for frequency 4G module。

The antenna with SMA connector should be used with connecting wire 。

4G series antenna			
	External antenna		Built-in antenna
Product	Black stick foldable integrated antenna	Suction cup antenna - 3 meters RG174 line	Built-inFPC antenna
Picture			
Frequency	824~960MHz/1710~2690MHz	824~960MHz/1710~2690MHz	824~960MHz/1710~2690MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤3.0	≤3.0	*
Gain	3.0dBi	*	*
Connector	base	SMA-JE/Tighten the non-rotatable	base
Length	223.5±3mm	231.5±3mm	73.8*42.0mm(FPC Size)
Sustaining power	≥1kg	≥3kg	≥1kg
Coaxial cable	1.13 line(red)	RG174 line	1.13 line(white)
Line length	106±3mm	3m	90±3mm
Polarization mode	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Module	4G Cat.1 Module	4G Cat.1 Module	4G Cat.1 Module

GPRS、NB-IoT Antenna

The antenna is only for frequency GPRS or NB-IoT module。

The antenna with SMA connector should be used with connecting wire 。

GPRS、NB-IoT series antenna			
	External antenna			Built-in antenna
Product	Black stick foldable integrated antenna	Suction cup antenna - 3 meters RG174 line	Small pepper antenna (can'n foldable)	Built-in PCB antenna
Picture				
Frequency	900~1800MHz	900~1800MHz/1710~1880MHz	900~1800MHz	900~1800MHz
Input resistance	50Ω	50Ω	50Ω	50Ω
VSWR	≤3.0	≤3.0	≤3.0	*
Gain	2dBi	*	*	*
Connector	base	SMA-JE/Tighten the non-rotatable	SMA-JE/Tighten the non-rotatable	base
Length	178.5±3mm	231.5±3mm	231.5±3mm	35.0*7mm（PCB Size）
Sustaining power	≥1kg	≥1kg	≥1kg	≥1kg
Coaxial cable	1.13 line(white)	RG174 line	*	1.13line
Line length	61±3mm	3m	*	60±3mm
Polarization mode	Linear polarization	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Module	GPS、NB-IoT Module	GPS、NB-IoT Module	GPS、NB-IoT Module	GPS、NB-IoT Module

GPS 天线

The antenna is only for frequency GPS module。

The antenna with SMA connector should be used with connecting wire 。

GPS series antenna		
External antenna		Built-in antenna
Product	GPS+BD dual band antenna	GPS Ceramic dual band antenna	GPS built-in ceramic antenna
Picture			
Frequency	1575±3MHz/1561±3MHz	1575±3MHz/1561±3MHz	1575.42MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤2.0	≤2.0	≤3.0
Gain	2.8±2dBi@3~5V	26-28dBi	18±2dBi
Connector	SMA-J Integral Connector (Gold Plated)	base	base
Voltage	DC(3~5V)	3~5V	3~5V
fixed form	Magnetic attraction	*	*
Size	55.50*50.40*17.61mm	25.0*25.0*5.6mm	15.0*15.0*6.7mm
Coaxial cable	RG174 line(black)	1.13 line	1.13 line
Line length	3m	95±3m	105m
Polarization mode	Circular polarization	Circular polarization	Circular polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Module	GPS Module	GPS Module	GPS Module

5.8G 天线

该天线仅适用于5.8G频段模组。
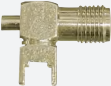
带有SMA接头的天线建议与连接线一起使用。

5.8G antenna		
External antenna		Built-in antenna
Product	Black stick foldable integrated antenna	Dual frequency WiFi	Steel sheet antenna
Picture			
Frequency	900~1800MHz	2400~2500MHz/5150~5850MHz	2400~2500MHz/5150~5850MHz
Input resistance	50Ω	50Ω	50Ω
VSWR	≤2.0	≤2.0	≤2.0
Gain	3dBi	2.85dBi(2.4G)/5.76dBi(5.8G)	2.18dBi(2.4G)/4.33dBi(5.8G)
Connector	base	base	base
Length	272±3mm	231.5±3mm	200±3mm
Sustaining power	1.5kg	1kg	1kg
Coaxial cable	1.37 line(black)	1.13 line(gray)	1.13 line
Line length	110±3mm	190±3mm	185±3mm
Polarization mode	Linear polarization	Linear polarization	Linear polarization
Radiation direction	All-directional	All-directional	All-directional
Operating temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Storage temperature	-30℃~+65℃	-30℃~+65℃	-30℃~+65℃
Module	WiFi Module	WiFi module、Bluetooth module	WiFi module、Bluetooth module

Antenna connecting wire

The connection wire can be used for module connection antenna.

The cable can be used for antenna series.

Product	SMA to IPEX RF cable	The four foot plate is installed with the connecting wire
Picture		
Frequency	0-3GHz	0-3GHz
Input resistance	50Ω	50Ω
VSWR	≤1.3	≤1.3
Connector	SMA-K/base	SMA-K/base
Sustaining power	≥1Kg	≥1Kg
Coaxial cable	1.13 line	1.13 line
vara	RF RF wire 1:11.4mm tooth length RF RF wire 2:11mm tooth length RF RF wire 3:11mm tooth length	RF RF wire 1:11.4mm tooth length RF RF wire 2:11mm tooth length RF RF wire 3:11mm tooth length
Line length	RF RF line 1: Grey line ~100mm±3mm RF RF wire 2: Black wire ~100mm±3mm RF RF wire 3: Black wire ~150mm±3mm	RF RF line 1: Grey line ~100mm±3mm RF RF wire 2: Black wire ~100mm±3mm RF RF wire 3: Black wire ~150mm±3mm