

www.ai-thinker.com



安信可科技  
Ai-Thinker

**shenzhen Ai-Thinker Technology Co.,Ltd**

ADD:408-410, Block C,Huafeng Smart  
Innovation Port,Gushu 2nd Road,Xixiang  
Baoan District,Shenzhen

Web:<http://www.ai-thinker.com>



**SERVE INTERNET  
OF THINGS**

Focus on wireless  
connection

shenzhen Ai-Thinker Technology Co.,Ltd

# COMPANY INFORMATION

shenzhen Ai-Thinker Technology Co.,Ltd.was established in 2012 and has been focusing on the IoT field.We are a leading provider of wireless modules and related solutions,focusing on communications equipment and the wireless IoT industry.We are a technology-intensive high-tech enterprise integrating design,R&D and production.As a pioneer in the Internet of Things industry,Ai-Thinker Technology has been committed to serving global partners and has become a leading wireless module supplier in the IoT industry.

B&T 博安通

Ai 安信可科技  
Ai-Thinker

R 睿班  
RFI-LAB



# PRODUCT CATALOG

**ESP8266 module** ————— 5

ESP-01/01S/07/07S/12E/12F/12S

**ESP32 module** ————— 7

ESP32-S/AIS/CAM

**GPS module** ————— 8

BG01-T/BG02/BG02-T

**Bluetooth module** ————— 9

TB-01/02/03F/04

**LoRa module** ————— 11

Ra-01/01H/02/06/07/07H/RG-01

**2.4G module** ————— 15

NF-01-S/01-N/02-PA/02-PE/03/04/04-MI

**NB-IOT module(N92)** ————— 17

**UWB module(BU01)** ————— 18

# ESP8266 module

- ESP-01
- ESP-07
- ESP-12E
- ESP-12S
- ESP-01S
- ESP-07S
- ESP-12F



Model	ESP-07S
Package	SMD-16
Size (mm)	17.0*16.0*3.0
Layer	4
Flash	32Mbit
Certificate	FCC, CE, REACH
Antenna	RoHS, SRRC
Indicator	IPEX antenna
Number of I/O port	-
	9




Model	ESP-12E
Package	SMD-22
Size (mm)	24.0*16.0*3.0
Layer	2
Flash	32Mbit
Certificate	-
Antenna	PCB antenna
Indicator	GPIO2
Number of I/O port	11



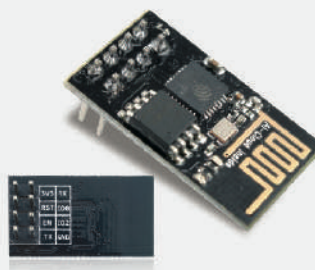
Model	ESP-12F
Package	SMD-22
Size (mm)	24.0*16.0*3.0
Layer	4
Flash	32Mbit
Certificate	FCC, CE, IC, SRRC, KCC, NCC, TELEC, ANATEL, REACH, RoHS
Antenna	PCB antenna
Indicator	GPIO2
Number of I/O port	9




Model	ESP-12S
Package	SMD-16
Size (mm)	24.0*16.0*3.0
Layer	4
Flash	32Mbit
Certificate	FCC, SRRC, CE, RoHS
Antenna	PCB antenna
Indicator	GPIO2
Number of I/O port	9

Model	ESP-01
Package	DIP-18
Size (mm)	24.7*14.4*11.0
Layer	4
Flash	8Mbit
Certificate	-
Antenna	PCB antenna
Indicator	GPIO2
Number of I/O port	2



Model	ESP-01S
Package	DIP-8
Size (mm)	24.7*14.4*11.0
Layer	2
Flash	8Mbit
Certificate	RoHS
Antenna	PCB antenna
Indicator	GPIO2
Number of I/O port	2

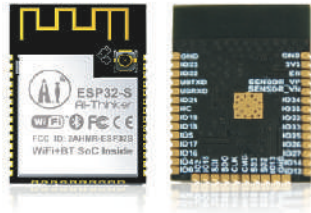


Model	ESP-07
Package	SMD-16
Size (mm)	21.2*16.0*3.0
Layer	4
Flash	8Mbit/16Mbit
Certificate	FCC, CE, SRRC, REACH, RoHS
Antenna	PCB antenna/IPEX antenna
Indicator	-
Number of I/O port	11

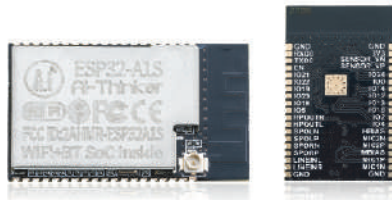


# ESP32 module

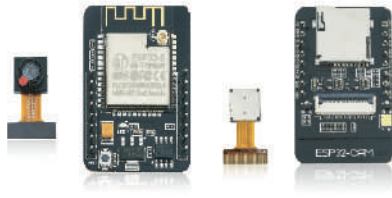
- ESP32-S
- ESP32-A1S
- ESP32-CAM



Model	ESP32-S
Package	SMD-38
Size	18.0*25.8*2.8
Layer	4
Flash	32Mbit
Certificate	FCC/CE/NCC/TELEC/RoHS SRRCC
Antenna	IPEX or PCB antenna



Model	ESP32-A1S
Package	SMD-38
Size	32.0*19.0*3.0
Layer	4
Flash	32Mbit
Certificate	-
Antenna	IPEX or PCB antenna



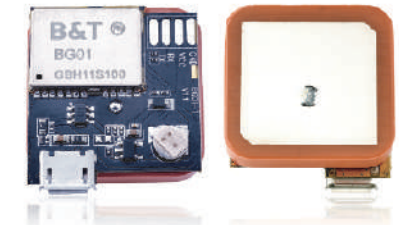
Model	ESP32-CAM
Package	DIP-16
Size	27.0*40.5*4.5
Layer	4
Flash	32Mbit
Certificate	-
Antenna	PCB antenna

# GPS module

- BG01-T
- BG02-T



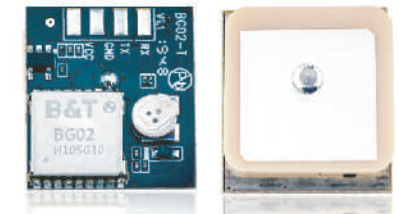
Model	BG01-T
Size	26.1x24.0x8.0(±0.2)MM
Operating Temperature	-20 °C ~ 85 °C
Storage Environment	-40 °C ~ 125 °C < 90%RH
Voltage	4.75 -5.25V
Authentication	RoHS



Model	BG02
Size	10.3*9.9*2.4(±0.2)MM
Operating Temperature	-40 °C ~ 85 °C
Storage Environment	-40 °C ~ 125 °C < 90%RH
Voltage	3.0 -3.6V
Authentication	RoHS



Model	BG02-T
Size	20.3*18.0*5.5(±0.2)MM
Operating Temperature	-20 °C ~ 85 °C
Storage Environment	-40 °C ~ 125 °C < 90%RH
Voltage	4.75 -5.25V
Authentication	RoHS



# Bluetooth module

- TB-01
- TB-03F
- TB-02
- TB-04

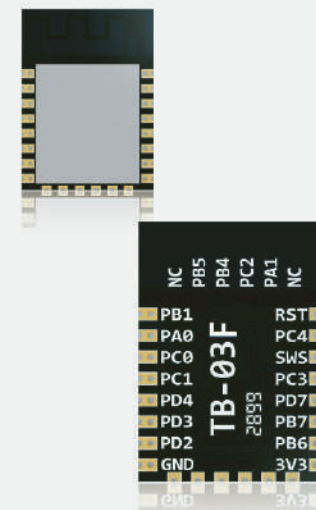


<b>Model Name</b>	TB-01
<b>Size</b>	22.0*14.0*2.0(±0.2)MM
<b>Package</b>	SMD-7 or DIP-5
<b>Wireless standard</b>	Bluetooth V4.2
<b>Frequency Range</b>	2400 ~ 2483.5MHz
<b>Output power</b>	10dBm
<b>Receiving sensitivity</b>	-92dBm
<b>Interface</b>	PWM
<b>Work temperature</b>	-20 °C ~ 70 °C
<b>Storage temperature</b>	-40 °C ~ 125 °C, < 90%RH
<b>Voltage</b>	2.7V ~ 3.6V, Current≥50mA
<b>Power</b>	Deep Sleep Mode: 0.9uA Sleep Mode: 1.9uA Mesh Mode: 30mA
<b>Transmission distance</b>	80-150m

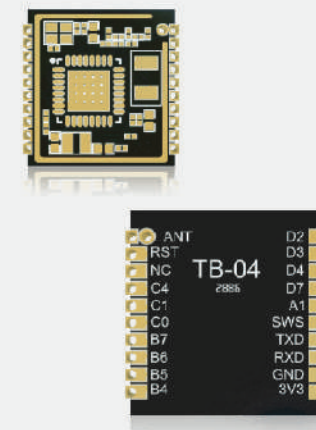


<b>Model Name</b>	TB-02
<b>Size</b>	18.0*18.0*2.8(±0.2)MM
<b>Package</b>	DIP-18 or SMD-13
<b>Wireless standard</b>	Bluetooth V5.0
<b>Frequency Range</b>	2400 ~ 2483.5MHz
<b>Output power</b>	10dBm
<b>Receiving sensitivity</b>	-93dBm
<b>Interface</b>	GPIO/PWM/SPI/ADC
<b>Work temperature</b>	-40°C ~ 85 °C
<b>Storage temperature</b>	-40 °C ~ 125 °C, < 90%RH
<b>Voltage</b>	2.7V ~ 3.6V, Current≥50mA
<b>Power</b>	Deep Sleep Mode: 0.8uA Sleep Mode: 1.8uA Mesh Mode: 12.62mA
<b>Transmission distance</b>	80-150m

<b>Model Name</b>	TB-03F
<b>Size</b>	24*16*3(±0.2)MM
<b>Package</b>	SMD-22
<b>Wireless standard</b>	Bluetooth V5.0
<b>Frequency Range</b>	2400 ~ 2483.5MHz
<b>Output power</b>	10dBm
<b>Receiving sensitivity</b>	-93dBm
<b>Interface</b>	GPIO/PWM/SPI/ADC/I2S
<b>Work temperature</b>	-40°C ~ 85 °C
<b>Storage temperature</b>	-40 °C ~ 125 °C, < 90%RH
<b>Voltage</b>	2.7V ~ 3.6V, Current≥50mA
<b>Power</b>	Deep Sleep Mode: 0.4uA Sleep Mode: 2.51uA TX(PRBS9)@10dBm: 6.36mA
<b>Transmission distance</b>	80-150m



<b>Model Name</b>	TB-04
<b>Size</b>	12.2*13.0*2.3(±0.2)MM
<b>Package</b>	SMD-20
<b>Wireless standard</b>	Bluetooth V5.0
<b>Frequency Range</b>	2400 ~ 2483.5MHz
<b>Output power</b>	10dBm
<b>Receiving sensitivity</b>	-93dBm
<b>Interface</b>	GPIO/PWM/SPI/ADC
<b>Work temperature</b>	-20°C ~ 70 °C
<b>Storage temperature</b>	-40 °C ~ 125 °C, < 90%RH
<b>Voltage</b>	2.7V ~ 3.6V, Current≥50mA
<b>Power</b>	Deep Sleep Mode: 0.8uA Sleep Mode: 1.8uA TX(PRBS9)@10dBm: 20.69mA



# LoRa module

- Ra-01
- Ra-01H
- Ra-02
- Ra-06

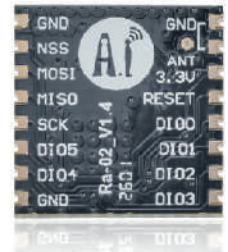


Module Model	Ra-01
Size	17*16*3.2(±0.1)MM
Package	SMD-16
Antenna	Spring antenna with gain of 2.5 dBi
Frequency Range	410MHz~525MHz
Max Transmit Power	18±1 dBm
Receive sensitivity	as low as -141 dBm
Interface	SPI
Operating Temperature	-30°C~85°C
Storage Environment	-40°C~90°C,<90%RH
Power Supply	2.5~3.7V Typical 3.3V
Power (Typical Values)	433MHz: TX:93mA RX:12.15mA Standby:1.6mA 470MHz: TX:97mA RX:12.15mA Standby:1.5mA
Programmable bit rate	UP to 300Kbps
Certification	REACH,RoHS
Networking functions	-



Module Model	Ra-01H
Size	17*16*3.2(±0.2)MM
Package	SMD-16
Antenna	Compatible half hole weld tray(need to weld antenna)
Frequency Range	803~930MHz
Max Transmit Power	maximum +19dBm
Receive sensitivity	as low as -140dBm
Interface	SPI
Operating Temperature	-40°C~85°C
Storage Environment	-40°C~125°C,<90%RH
Power Supply	2.7~3.6V, typical value 3.3V current over 200mA
Power (Typical Values)	received current is 12.15mA stand-by current is 1.6mA
Programmable bit rate	300Kbps
Certification	REACH,RoHS
Networking functions	-

Module Model	Ra-02
Size	17*16*3.2(±0.1)MM
Package	SMD-16
Antenna	IPEX
Frequency Range	410~525MHz
Max Transmit Power	18±1 dBm
Receive sensitivity	as low as -141 dBm
Interface	SPI
Operating Temperature	-30°C~85°C
Storage Environment	-40°C~90°C,<90%RH
Power Supply	2.5~3.7V Typical 3.3V
Power (Typical Values)	433MHz: TX:93mA RX:12.15mA Standby:1.6mA 470MHz: TX:97mA RX:12.15mA Standby:1.5mA
Programmable bit rate	UP to 300Kbps
Certification	REACH,RoHS
Networking functions	-



Module Model	Ra-06
Size	16*22.8*2.2(±0.2)MM
Package	SMD-20
Antenna	IPEX/Through-hole solder
Frequency Range	410~525MHz
Max Transmit Power	+20dBm
Receive sensitivity	as low as -140dBm
Interface	SPI/URAT/I2C
Operating Temperature	-40°C~85°C
Storage Environment	-40°C~125°C,<90%RH
Power Supply	2.7~3.6V,typical value 3.3V,current over 200mA
Power (Typical Values)	received current is 12.15mA stand-by current is 1.6mA
Programmable bit rate	UP to 300Kbps
Certification	REACH,RoHS
Networking functions	-



# LoRa module

- Ra-07
- Ra-07H
- RG-01



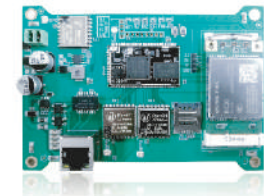
<b>Module Model</b>	Ra-07
<b>Size</b>	16*16*3(±0.2)MM
<b>Package</b>	SMD18
<b>Antenna</b>	Stamp hole pad / IPEX terminal
<b>Frequency Range</b>	410MHz~525MHz (default)
<b>Max Transmit Power</b>	19dBm±1
<b>Receive sensitivity</b>	-136dBm±1
<b>Interface</b>	UART/GPIO/PWM/SWD/ADC/I2C
<b>Operating Temperature</b>	-40°C~85°C
<b>Storage Environment</b>	-40°C~125°C,<90%RH
<b>Power Supply</b>	Power supply voltage 3.3V
<b>Power (Typical Values)</b>	Sleep mode: 3uA Standby mode: 6mA Full load mode(TX: 21dBm): 107mA
<b>Programmable bit rate</b>	-
<b>Certification</b>	-
<b>Networking functions</b>	-



<b>Module Model</b>	Ra-07H
<b>Size</b>	16*16*3(±0.2)MM
<b>Package</b>	SMD18
<b>Antenna</b>	Stamp hole pad / IPEX terminal
<b>Frequency Range</b>	803MHz~930MHz (default)
<b>Max Transmit Power</b>	20dBm±1
<b>Receive sensitivity</b>	-136dBm±1
<b>Interface</b>	UART/GPIO/PWM/SWD/ADC/I2C
<b>Operating Temperature</b>	-40°C~85°C
<b>Storage Environment</b>	-40°C~125°C,<90%RH
<b>Power Supply</b>	Power supply voltage 3.3V
<b>Power (Typical Values)</b>	Sleep mode: 3uA Standby mode: 6mA Full load mode(TX: 21dBm): 107mA
<b>Programmable bit rate</b>	-
<b>Certification</b>	-
<b>Networking functions</b>	-



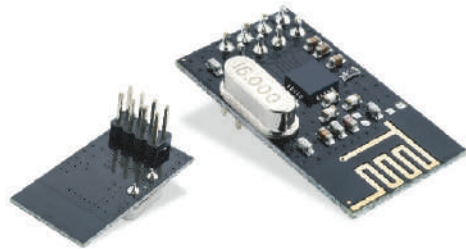
<b>Module Model</b>	RG-01
<b>Size</b>	160MM*100MM*60MM
<b>Package</b>	-
<b>Antenna</b>	Extenal antenna
<b>Frequency Range</b>	LoRa frequency range: 410-525MHz
<b>Max Transmit Power</b>	20dBm
<b>Receive sensitivity</b>	-148dBm
<b>Interface</b>	-
<b>Operating Temperature</b>	-20°C~60°C
<b>Storage Environment</b>	-40 °C ~ 125 °C , < 90%RH
<b>Power Supply</b>	DC9~55V (Advised 12V,1A)/Standard POE
<b>Power (Typical Values)</b>	7W
<b>Programmable bit rate</b>	-
<b>Certification</b>	-
<b>Networking functions</b>	4G / WIFI / Ethernet port





# 2.4G module

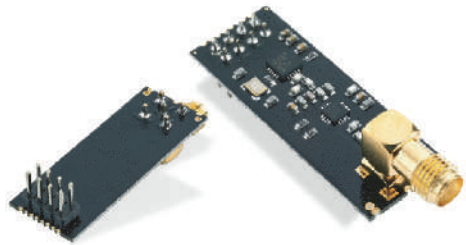
- NF-01-S
- NF-01-N
- NF-02-PA
- NF-02-PE
- NF-03
- NF-04
- NF-04-MI



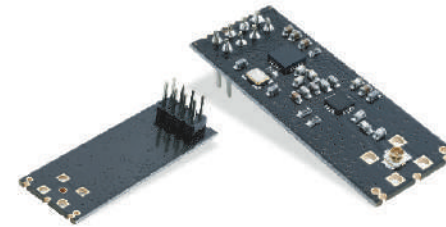
Model	NF-01-S
Chip	SI24R1
Communication interface	SPI
MAX power (mW)	5
Distance (m)	240
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	PCB antenna
Package	DIP
Size	28.6*15.3



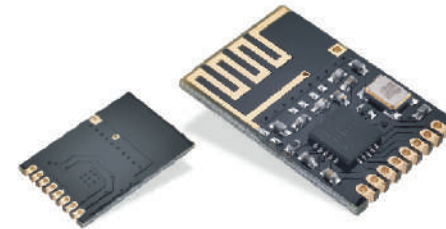
Model	NF-01-N
Chip	nRF24L01+
Communication interface	SPI
MAX power (mW)	1
Distance (m)	100
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	PCB antenna
Package	DIP
Size	28.6*15.3



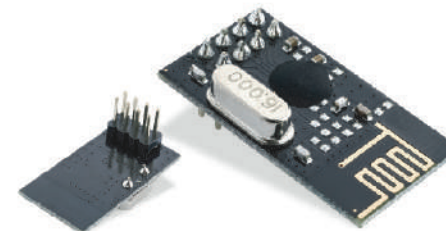
Model	NF-02-PA
Chip	nRF24L01+
Communication interface	SPI
MAX power (mW)	100
Distance (m)	1000
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	SMA antenna
Package	DIP
Size	40.8*15.3



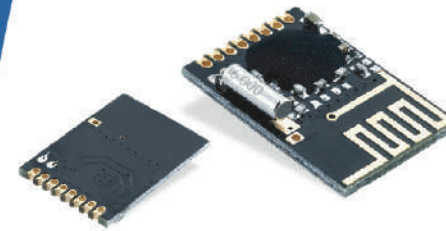
Model	NF-02-PE
Chip	nRF24L01+
Communication interface	SPI
MAX power (mW)	100
Distance (m)	1000
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	IPEX antenna
Package	DIP
Size	40.8*15.3



Model	NF-03
Chip	SI24R1
Communication interface	SPI
MAX power (mW)	5
Distance (m)	240
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	PCB antenna
Package	SMD
Size	18.0*12.0



Model	NF-04
Chip	BK2425
Communication interface	SPI
MAX power (mW)	2.5
Distance (m)	120
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	PCB antenna
Package	DIP
Size	28.6*15.3

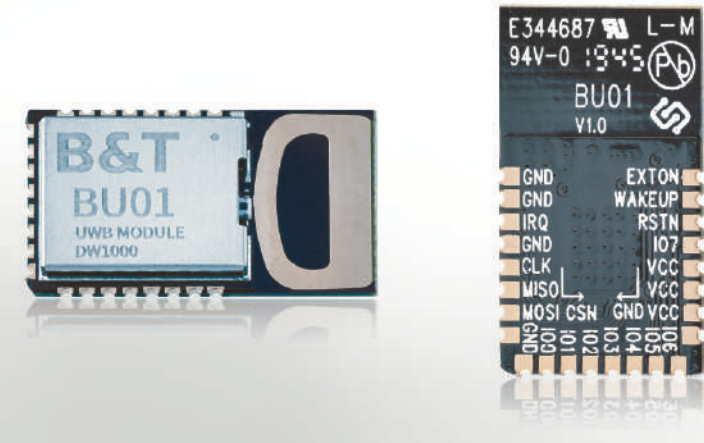


Model	NF-04-MI
Chip	BK2425
Communication interface	SPI
MAX power (mW)	2.5
Distance (m)	120
Voltage	1.9-3.6V
Rate(bps)	250K-2M
Antenna	PCB antenna
Package	SMD
Size	18.0*12.0

# NB-IOT module (N92)



# UWB module (BU01)



Function	Description	N92 (HS0S100)	N92 (HD0S100)	N92 (HSG0S100)
NB-IOT	Mid-Band (1710 – 1980 MHz)	NA	Support	NA
	Low-Band (814 – 915 MHz)	Support	Support	Support
GNSS	GPS/BDS/GLONASS/GALIL EO	NA	NA	Support
UART	NB-IOT UART	2	2	2
	GNSS UART	NA	NA	1
I2C	NB-IOT I2C	1	1	1
SIM	NB-IOT SIM	1	1	1
ADC	NB-IOT ADC	1	1	1
RESET	NB-IOT reset	Support	Support	Support
PPS	GNSS PPS	NA	NA	1
Antenna interface	NB-IOT	1	1	1
	GNSS	NA	NA	1
Voltage	3.8-4.2V	Typical 4.0V	Typical 4.0V	Typical 4.0V
Packaging		23.6x19.9mm	23.6x19.9mm	23.6x19.9mm

## Product Specifications

Model name	BU01
Size	23*13*2.9(±0.2)MM
Antenna	PCB antenna
Frequency range	3.5 GHz to 6.5 GHz
Working temperature	-20 °C ~ 85 °C
Storage temperature	-40 °C ~ 125 °C , < 90%RH
Power	2.8V ~ 3.6V, default 3.3V, current >200mA
Interface	SPI