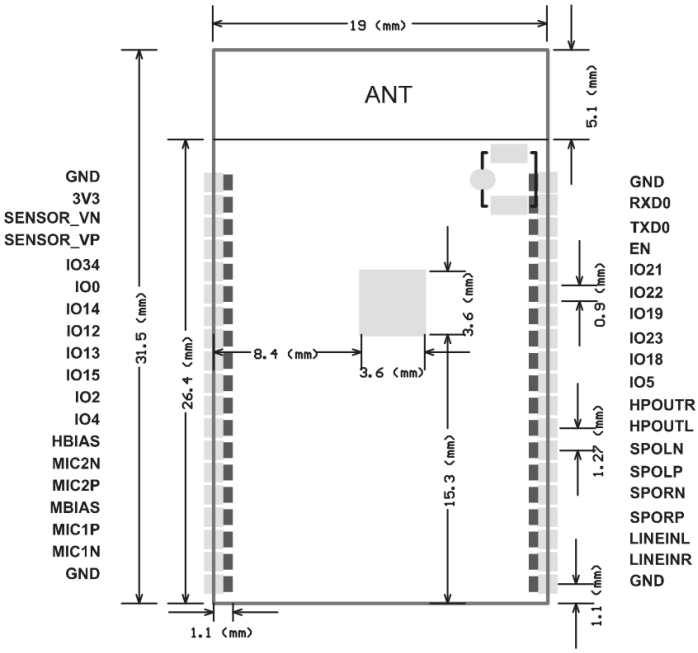
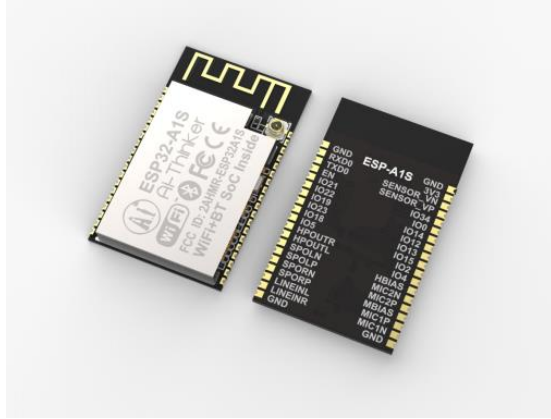
ESP32-A1S Module





Features

- The smallest 802.11b/g/n Wi-Fi BT SoC Module
- Low power 32-bit CPU,can also serve the application processor
- Built-in ES8388 Codec audio decoding chip, can support playing music and recording
- Built-in 520 KB SRAM, external 4MPSRAM
- Supports UART/SPI/I2C/PWM/ADC/DAC
- Support for firmware upgrade (FOTA)
- Antenna supports on-board antenna or IPEX block output
- Supports a variety of mainstream compression and lossless audio formats, including M4A, AAC, FLAC, OGG, OPUS, MP3, WAV, etc.
- Supports audio input methods such as MIC and Line-in.

Overview

ESP32-A1S is an ultra-small, powerful module. Built-in advanced low-power dual-core 32-bit CPU and Codec ES8388 audio decoding chip, can be widely used in various IoT applications, suitable for home smart devices, smart Audio, story machine solutions, etc., are the ideal solution for IoT applications.

ESP32-A1S internal circuit is highly integrated, supports a variety of peripherals, can support secondary development, and quickly realize product differentiation.

ESP32-A1S adopts SMD package to realize rapid production of products and provide customers with high-reliability connection mode. It is especially suitable for modern, large-scale, low-cost production methods, and is convenient for various IoT hardware terminal applications.

Product Specifications

Module Model	ESP32-A1S
Package	SMD-38
Size	32mm*19mm*3mm
SPI Flash	Default 32Mbit
RAM	520KB SRAM +4M PSRAM
Bluetooth	Bluetooth 4.2 BR/EDR and BLE standards, support A2DP, AVRC protocol, etc.
Wi-Fi	802.11 b/g/n/e/i， Support DLNA protocol
Audio Output	Support 1 channel headphone output and 1 channel left and right speaker output
Audio Input	Support LINEIN and 2-way MIC input
Custom IO port	14
UART Baudrate	Default 115200 bps
Audio Format	MP3、WAV、M4A、AAC、FLAC、OGG、OPUS
Antenna	Onboard PCB antenna and antenna carrier
Transmit Power	802.11b: 17±2 dBm (@11Mbps) 802.11g: 14±2 dBm (@54Mbps) 802.11n: 13±2 dBm (@MCS7)
Receiving Sensitivity	CCK, 1 Mbps : -90dBm CCK, 11 Mbps: -85dBm 6 Mbps (1/2 BPSK): -88dBm 54 Mbps (3/4 64-QAM): -70dBm MCS7 (65 Mbps, 72.2 Mbps): -67dBm
Power Dissipation	350mA
Security	WPA/WPA2/WPA2-Enterprise/WPS
Power Supply Range	3.3V±0.3V
Operating Temperature	-40 ℃ ~ 85 ℃
Storage Environment	-40 ℃~125 ℃ , < 90%RH
Weight	2.5±0.05g

Module pin definition

GPIO	Features	Types	Remarks
TXD0	GPIO1/CLKOUT2	I/O	Download serial port
RXD0	GPIO3/CLKOUT3	I/O	
EN		I	Reset function
IO21	U0CTS/VSPIQ	I/O	
IO22	U0RTS/VSPIWP	I/O	
IO19	VSQIQ/U0CTS	I/O	
IO23	VSPIIDHS1STROBE	I/O	
IO18	VSPICLK/HS1DATA7	I/O	
IO5	VSPICS0	I/O	
HPOUTR		O	Headphone output
HPOUTL		O	
SPOLN		O	Speaker left channel output
SPOLP		O	
SPORN		O	Speaker right channel output
SPORP		O	
LINEINL		I	Headphone input
LINEINR		I	
SENSOR_VN	GPIO34/ADC1_3RTCIO3	I	
SENSOR_VP	GPIO36/ADC1_0/RTCIO0	I	
IO34	ADC1_6/RTCIO4	I	
IO0		I/O	Must be hanging when using internal codec
IO14	ADC2_6/RTCIO16/SDCLK/HSPICKJ/HS2CLK	I/O	
IO12	ADC2_5/RTCIO15/HSPIQ/SDDATA2/HS2DATA2	I/O	
IO13	ADC2_4/RTCIO14/HSPIID/SDDATA3/H2DATA3	I/O	
IO15	ADC2_3/RTCIO15/HSPICS0/SDCMD/HS2CMD	I/O	
IO2	ADC2_2/RTCIO12/SDDATA0/	I/O	

	HS2DATA0		
IO4	ADC2_3/RTCIO10/HSPIHD/SDDATA1/HS2DATA1	I/O	
HBIAS		O	MIC2 control pin
MIC2N		I	MIC2 input
MIC2P		I	
MBIAS		O	MIC1 control pin
MIC1P		I	MIC1 input
MIC1N		I	

Strapping pin

System startup mode			
PIN	Default	Normal operation	Download
GPIO0	Pull up	NC	0
GPIO2	Pull down	Irrelevant item	0
Built-in LDO (VDD_SDIO) voltage			
PIN	Default	3.3V	1.8V
MTDI/GPIO12	Pull down	0	1

Note: the built-in flash working voltage is 3.3 V, and the model chip with built-in flash needs to pull down or suspend the MTDI when it is powered on.

Module schematic

ESP32 ES8388 I2SPin connection	
ES8388	ESP32
I2S_SDOUT	IO35
I2S_SDIN	IO25
I2S_LRCK	IO26
I2S_BCLK	IO27
I2S_MCLK	IO0
ESP32 ES8388 I2C Pin connection	
ES8388	ESP32
SCL	IO32
SDA	IO33

OEM/Integrators Installation Manual

Important Notice to OEM integrators

INTEGRATION INSTRUCTIONS

FCC rules

The ESP32-A1S is an WIFI+BT Module Module with frequency hopping using an ASK modulation. It operates on the 2400 ~2500 MHz band and, therefore, is within U.S. FCC part 15.247 standard.

Modular installation instruction

1,ESP32-A1S Integrates high-speed GPIO and peripheral interface. Please pay attention to the installation direction (pin direction).

2,Antenna could not be in no-load state when module is working. During debugging, it is suggested to add 50 ohms load to the antenna port to avoid damage or performance degradation of the module under long-time no-load condition.

3,When the module needs to output 31dBm or more power, it needs a voltage supply of 5.0V or more to achieve the expected output power.

4,When working at full load, it is recommended that the entire bottom surface of the module be attached to the housing or heat dissipation plate, and it is not recommended to conduct heat dissipation through air or screw column heat conduction.

5,UART1 and UART2 are serial ports with the same priority. The port which receives commands returns information.

Trace antenna designs

Not Applicable

RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

Antennas

The ESP32-A1S is an UHF RFID Module beams signals and communicates with its antenna, which is PCB Antenna . The PCB Antenna gain is 1dBi

LABEL OF THE END PRODUCT

The final end product must be labeled in a visible area with the following：

Host must Contains FCC ID: 2AHMR-ESP32A1S. If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

Information on test modes and additional testing requirements5

Data transfer module demo board can control the EUT work in RF test mode at specified test

channel.

Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

ATTENTION

This device is intended only for OEM integrators under the following conditions: 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) This device and its antenna(s) must not be co‑located with any other transmitters except in accordance with FCC multi‑transmitter product procedures. Referring to the multi‑transmitter policy, multiple transmitter(s) and module(s) can be operated simultaneously without C2P.

3) For all products market in US, OEM has to limit the Operating Frequency: 2400 ~2500MHz by supplied firmware programming tool. OEM shall not supply any tool or info to the end‑user regarding to Regulatory Domain change.

USERS MANUAL OF THE END PRODUCT:

In the user manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio‑frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

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

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.