盛微先進科技
SAVITECH CORP.


# SA9800

## IEEE 802.11n 2.4GHz Wireless Audio Module With AirPlay function

**V1.8**

**SAVITECH Corporation**

# BRAVO-DSD/PCM
# SA9800
# Airplay Wireless-Audio Module

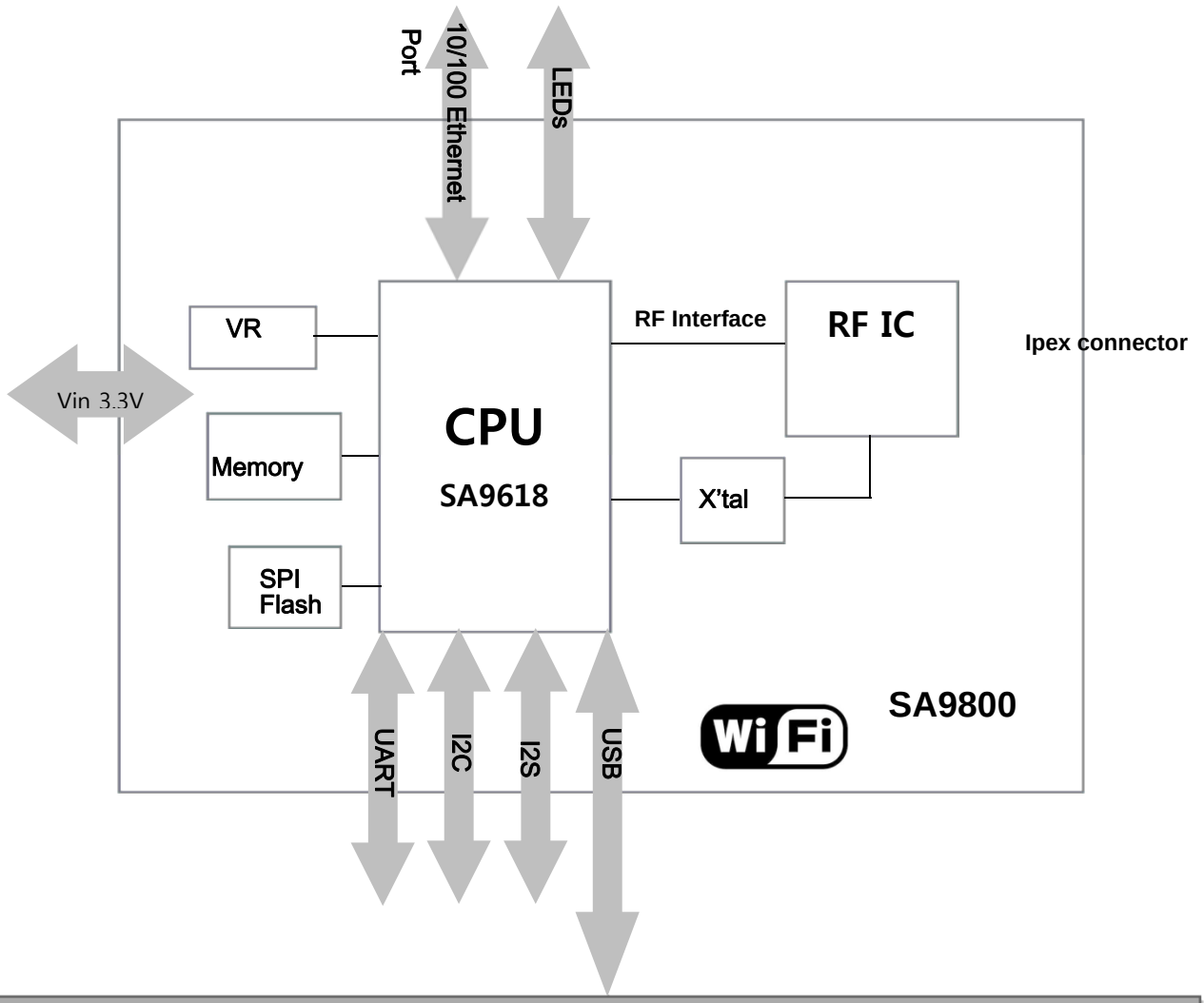
## Overview

The SA9800 is Airplay Wireless Audio module lets you wirelessly stream what you're listening to on your iOS device, iTunes or OS X computer to the SA9800. It is a host-less design and no extra host MCU required for wireless audio applications. The built-in high-speed processor handles all of network and audio functions. The auto-grouping function allows user to set multiple wireless speakers into a group for creating either multi-room audio broadcasting or a pair of left/right channel speakers applications easily.

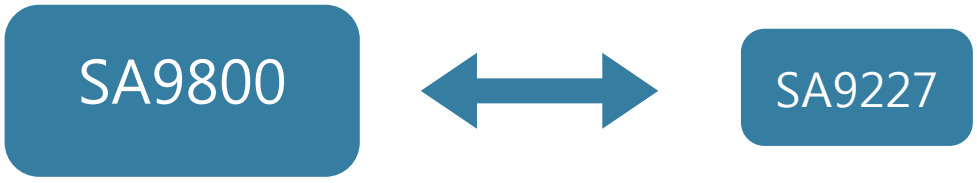
## Features

- Built-in IEEE 802.11n 150 Mbps.
- Support AP client mode and AP mode
- I2S digital audio input/output Interface up to 2CH 16bits/48KHz
- USB 2.0 interface to connect Hi-End USB audio SoC
- Co-processor supports up to 32bits/384KHz and DSD64/128
- Host-less design for AirPlay applications
- AirPlay audio streaming/control
- Apple's Wireless Accessory Configuration technology
- APP and web browser for easily configuration
- DLNA audio renderer.
- SaviCast Virtual Sound Card Driver for Windows PC wireless audio streaming.
- Auto grouping for multiple speakers application
- Paring 2 audio module to L/R Speaker.
- I2S input can support AUX in or Bluetooth audio input to multi-room broadcasting.
- UART for connecting to external MCU.
- OTA firmware upgrade
- Allow iPhone /iPod Dock share one Apple CP.

## Module Block Diagram




## Module and Audio Co-processor System Diagram




32/384K I2S
24/384K SPDIF
DSD64/DSD128
HID
GPIOs
MIDI
UART
Ethernet
Low jitter

## Module Pin Definition

| Pin No. | Type | Description | Pin No. | Type | Description |
|---|---|---|---|---|---|
| **1** | P | VDD3.3V | **16** | I | RXIN |
| **2** | G | GND | **17** | O | TXON |
| **3** | I/O | USB_DM | **18** | G | GND |
| **4** | G | GND | **19** | I/O | I2S_WS |
| **5** | I/O | LED3 (I2C_Int) | **20** | I | I2S_SDI |
| **6** | O | LED2<br>Low Active | **21** | G | GND |
| **7** | G | GND | **22** | I | UART_RX |
| **8** | O | UART_TX | **23** | G | GND |
| **9** | G | GND | **24** | I/O | I2C_DATA |
| **10** | O | I2S_MCLK | **25** | O | I2C_CLK |
| **11** | O | I2S_SCK | **26** | I/O | Tack-SW<br>Low Active |
| **12** | O | I2S_SDO | **27** | O | LED4 LAN<br>Low Active |
| **13** | G | GND | **28** | I/O | USB_DP |
| **14** | O | TXOP | **29** | G | GND |
| **15** | I | RXIP | **30** | P | VDD3.3V |

The signal type codes are used in the tables: I:Input ; O:Output; P:Power pin; G:Ground;
* TXOP/TXON:10/100M Ethernet physical layer transmit pair. For differential data reception.
* RXIP/RXIN:10/100M Ethernet physical layer receive pair. For differential data reception

## LED Definition

| LED | Status | Definition |
|---|---|---|
| **LED2 Ready** | Off | SA9800 cannot establish a connection to the network |
| | On | Network Ready |
| | Blinking | WAC mode |
| **LED3 Error** | Blinking | Connecting fail |
| **LED 4 LAN** | **On** | Ethernet active and get connection |

## Pin26 Tack Switch

Tack switch support following features

1. WAC mode: Push button for 3 seconds
2. Reset to default: Push button for 10 seconds
3. Power off mode: Push button twice

## Communicate with customer's MCU

If customer uses SA9800 works with external MCU, please contact your Account Manager to get the documentation of "UART Command Set".

For Detailed information, please refer to Appendix 1

## I2S Bus

WS clock is the defined sampling rate frequency

- SCLK is 32x the sampling rate frequency, which means maximum 16-bit channel sampling issupported
- For MCLK, typically a 256x sampling rate frequency is supported. Following table shows a sampleclock configuration

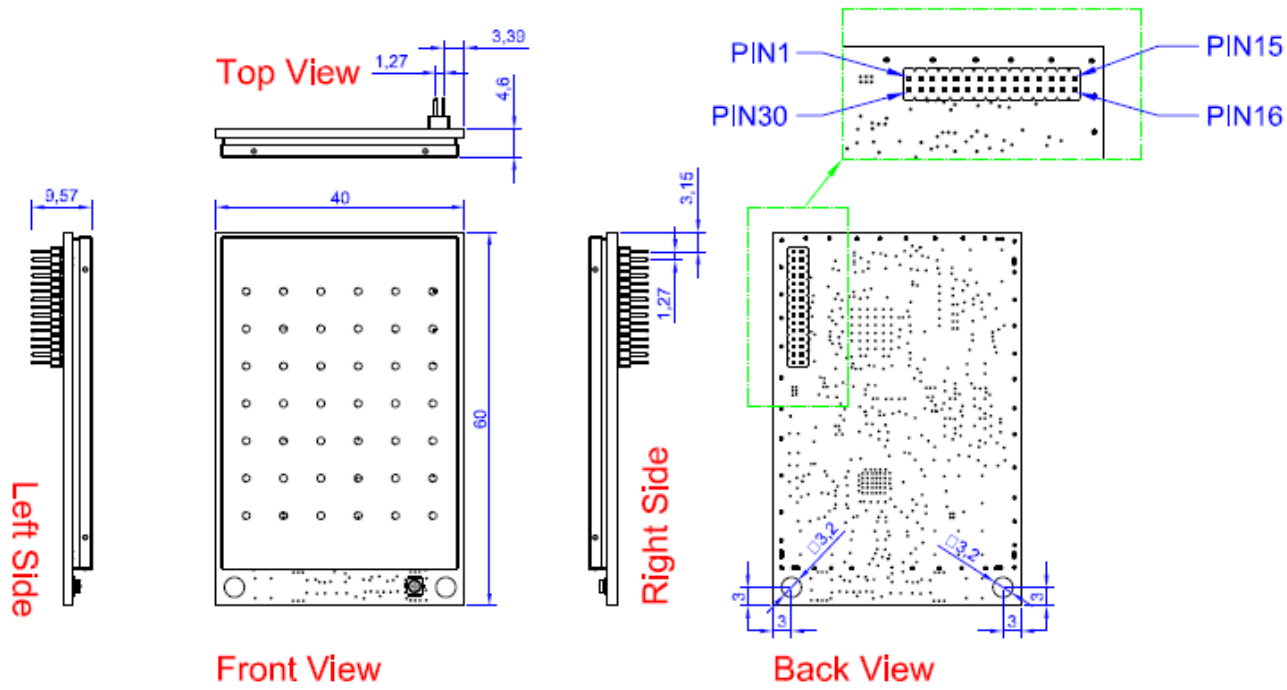
| **Signal Line** | **Description** | |
|---|---|---|
| | Frequency | Sampling Rate |
| **SCLK (16-bit)** | 3.072MHz | 96.0kHz |
| | 1.536MHz | 48.0kHz |
| | 1.024MHz | 32.0kHz |
| | 0.768MHz | 24.0kHz |
| | 0.512MHz | 16.0kHz |
| | 0.256MHz | 8.0kHz |
| MCLK (16-bit) | 24.576MHz | 96.0kHz |
| | 12.288MHz | 48.0kHz |
| | 8.192MHz | 32.0kHz |
| | 6.144MHz | 24.0kHz |
| | 4.096MHz | 16.0kHz |
| | 2.048MHz | 8.0kHz |
| **WS (16-bit)** | WS=0 to Left Channel (MONO).<br>WS=1 to Right Channel. | |
| **SDO** | Transmits Voice/Audio Data Channel.<br>Serial data is transmitted in 2's complement, with MSB first, and synchronized with the trailing (HIGH to LOW) edge of the clock signal. | |
| **SDI** | Receives Voice/Audio Data Channel.<br>Serial data is transmitted in 2's complement, with MSB first, and synchronized with the trailing (HIGH to LOW) edge of the clock signal. | |

## Specifications

Wireless Specification

| Feature | Detailed Description |
|---|---|
| **Standard** | IEEE 802.11 b/g/n One Path 2.4 GHz |
| **Data Rate** | Up to 150 Mbps |
| **Security** | WEP, WPA-PSK, WPA2-PSK |
| **Antenna** | I-PEX connector |
| **Range** | Up to 50 meter LOS |
| | |
| **Absolute Maximum Ratings** | |
| **Feature** | Detailed Description |
| **Storage Temperature** | -40°C to +85°C |
| **Operating Temperature** | 0°C to +70°C |
| **DC Input Voltage** | 3.3V +/- 10% |
| **Max. Power** | 3.3V 800mA |
| **Dimension** | |
| **RF Board** | 60x40x9.57 mm |

## Module Mechanical Data



## Software Support

AirPlay

-Apple Airplay Audio for MFI customer

dlna + DSD Direct Stream Digital

-DLNA renderer
Built-in following audio decoder,
- -MP3
- -DSD
- -WAV
- -WMA
- -M4A
- -FLAC
- -AAC

Savitech is NOT responsible for licensing issue, please contact following organizations to license the audio CODECs.
http://mp3licensing.com/royalty/software.html
http://www.vialicensing.com/licensing/aac-fees.aspx
http://windows.microsoft.com/en-us/windows/windowsmedia-components-licensing

Microsoft Windows

Savitech Virtual Sound Card Driver for Windows PC, it allows PC to stream system audio to SA9800 wirelessly.
The driver support Windows7 and Windows 8.

**Other Advanced Features**

-Multi-room Mode
-Stereo Pair, Paring 2 audio module to L/R Speaker
-UART for connecting to external MCU.

**Appendix:**

# Customized Design Issues on SA9800 Module

SA9800 module provide following ways to support our customer customized design:

## 1. Customized items on manufacturing test program

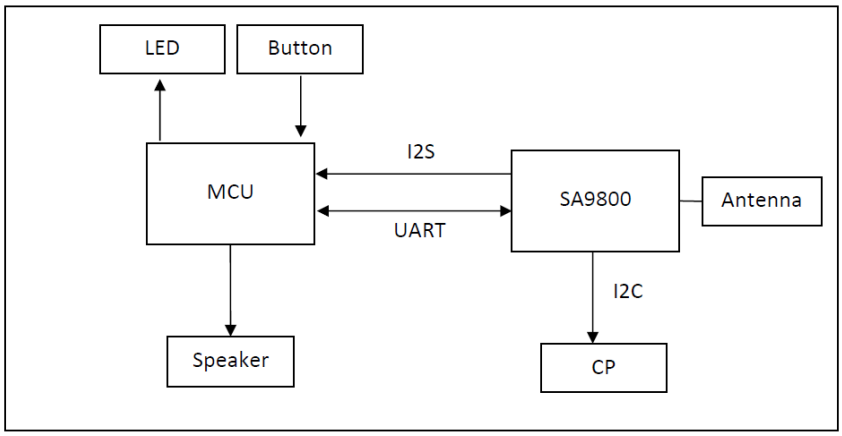
Customer can modify following items while running test program after speaker is assembled.

| (1) Default Setting | (2) Enable/Disable features | (3) Webpage |
|---|---|---|
| Device Name | DLNA Renderer | Change Logo and webpage |
| Manufacture Name | DLNA audio format | |
| Model Name | SaviCast PC | |
| Airplay Play Password | Multiroom | |
| Airplay deny interrupt | Stereo Pair | |
| WLAN SSID | Airplay | |
| WLAN Domain | Airplay multiroom | |
| WLAN Channel | AUX IN multiroom | |
| WLAN Auth Type | Bluetooth | |
| WLAN Encryption | Audio Output Interface | |
| WLAN Security Key | WAC | |
| IP address | Volume Control | |
| Subnet Mask | WAC Configured | |
| DHCP | Firmware Version | |
| DHCP Server Range Start | Product ID | |
| DHCP Server Range End | | |

## 2. Working with 3rd party MCU

SA9800 module firmware already support UART Command. Our customers can connect their MCU to SA9800 via UART interface.

Document of ”UART Command Set” can be downloaded from our support website.




## 3. iOS & Android APP source code

Savitech provide iOS &Android APP "BRAVO-W" source code based on SLA (Software License Agreement).

Note: Besides basic feature, BRAVO-W APP also provide following customized design
-APP works with specific device based on unique Manufacture Name & Model Name, Above "Manufacture Name & Model Name" can be burn-in to device by manufacturing test program.

-Setup unique firmware upgrade web address, to ensure customer's device upgraded correct firmware。

## 4. Customized Design Support

Customized design support service is possible. Customers need to discuss with your Account Manager in Savitech.