

# Audio Player - WAV Format - Micro SD Card

Sunrom Part#  
**1427**

High Quality Audio Player based on ARM 32 bit controller, Plays almost any uncompressed WAV audio file, mono/stereo, 8/16 bits with sampling rates from 8 Khz to 48 Khz. Can control from Serial UART or 16 External Triggers

User's  
Manual

Doc Version: 1  
1-Aug-16

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<http://www.sunrom.com/m/1427>

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## Introduction

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Board plays wav files from memory card giving high quality sound output. The board is controlled from an external microcontroller or PC which sends simple ASCII string telling board what to play. You can also give it external triggers if you want standalone operation.

The board is a tiny Audio-Sound module that can play back pre-stored audio files such as voice and music from a micro-SD memory card. The module supports various 8/16 bit stereo/mono uncompress audio files having sampling rate from 8Khz to 48Khz. By using the free available software tool, any audio file(WAV, MP3, PCM, etc) can be easily converted to supported format. The compact board takes minimal board space and is ideal for any application that required embedded audio.

The board is controlled through simple serial commands. Board is a very flexible, compact and low cost embedded audio solution for any applications.

Accepts any micro SD memory card from 128MB to 32GB. These memory cards are available at very low cost due to wide use in mobile phones.

## Features

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- Low cost module for all embedded audio-sound applications
- Plays high quality audio
- Can interface with any microcontroller or PC Serial port
- Standalone operation with 16 external triggers or auto playback of file.
- Accepts any Micro SD Card from 128MB to 32GB which is FAT16 or FAT32 formatted
- Simple to use and low cost
- Indicating LEDs
- Compact size

## Applications

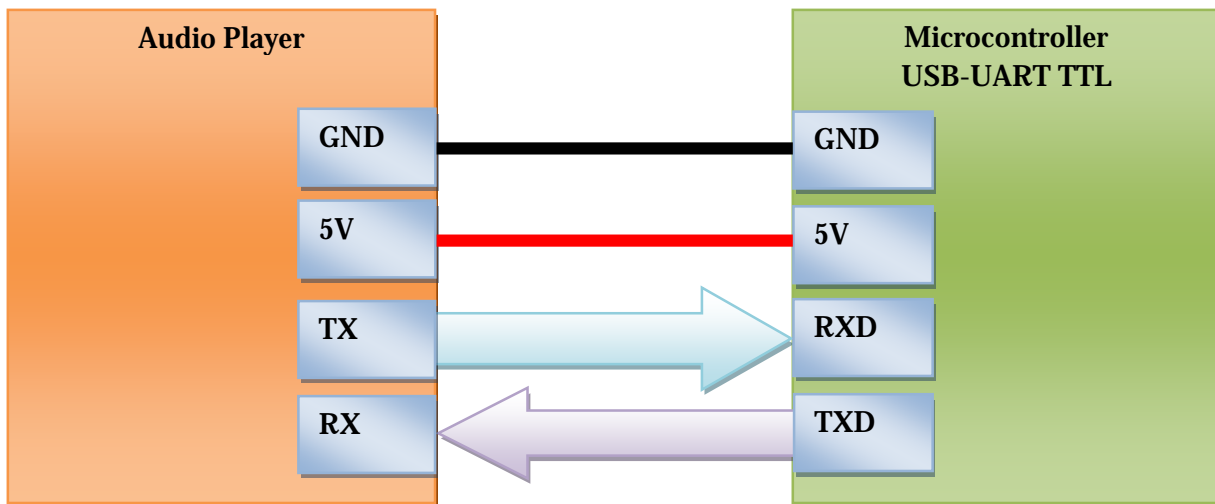
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- General purpose embedded audio and sound applications
- All voice annunciator systems.
- Automobile, Parking radar, GPS navigation systems
- Elevator, Security, Access-Control and Warning devices.
- Intelligent home automation and domestic applications
- Robotics and Industrial Control
- Traffic facilities: Toll gates, parking lots.
- Toys, learning tools, talking books and all gaming sound effects.
- MP3 player like simple devices

## Interfacing with Microcontroller or USB-UART TTL

If you want to operate with microcontroller then it's very simple to connect just 4 pins of modules like below.

If you want to operate with a PC then use a typical USB-UART of TTL level(not RS232) with same connections like below.



## Specifications

Parameter	Value
Working Voltage	5V DC regulated power supply
Current Consumption	65 mA
Serial Baud rate	9600 bps
Baud rate format	8-N-1; 1 Start bit, 8 Data bits, 1 Stop Bits, No Parity
On Board controller	STM32F103C8 - 32 bit ARM Cortex M3
UART Interface	Suitable for interfacing with microcontrollers UART pins operating at 5V or 3.3V. Note, Do not connect directly to PC serial port which is at RS232 level, Add MAX232 for level conversion.
Trigger Interface	16-Active low triggers with internal pull ups
Audio Output	Stereo
Audio Resolution	16 bit
Audio Output Level	5 mW
Audio Sampling Rate	8 Khz to 48 Khz
SD Card	128MB to 32GB formatted either as FAT16 or FAT32

## Module Pin Details

Pin	Details
GND	Common Ground
+5V	Regulated positive power input of 5V DC
TX-OUT	Transmit Output - UART TTL level - Connects to RXD pin of microcontroller
RX-IN	Receive Input - UART TTL level - Connects to TXD pin of microcontroller

## Control Commands

Following are the commands you can use to control the board, Commands and response are simple ASCII strings you can send from microcontroller or write directly in terminal.

Command	Name	Response	Details
Pxxx<Enter Key>	Play audio file	K or E	Plays a wav file. Where xxx is the name of audio file without extension. For Ex. If you want to play test.wav Then send Ptest followed by Enter key ('r', 0x0D, 13 in decimal). The file name is not case sensitive.  If play back was started the board responds with ASCII character K.  On Error the board returns E as error.  Files names follow MS-DOS 8+3 (Name+Extension) type naming scheme.
S	Stop playback	K	Stop playing whatever it is currently playing. Always returns K, as acknowledgement of the command
?	Query if playing	Y or N	If board is busy playing a file it return Y else N
L	Loop on	K	Default behavior at power up, Once you give file play command it keeps playing from start once it finish playing. Always returns K, as acknowledgement of the command
X	Loop off	K	Once you give file play command it stop playback when the file ends. Always returns K, as acknowledgement of the command

## External Triggers

Board has 16 triggers for playing a file upon external signal input. In Idle condition all triggers at internally pulled up. Making any trigger pin to ground will trigger it. You can either connect a switch between trigger input and ground or give a low going signal from your microcontroller. Your microcontroller is operating at 5V then add a 10K resistor in series. If your microcontroller is working at 3.3V then you do not need to add a series resistor.

Triggers are named 1 to 16. Triggering #1 then board will attempt to play 1.wav like that if you trigger #16 then board will attempt to play 16.wav file if present on board. If such files does not exists then the RED error LED will glow. If file is played then Yellow Status LED will glow.

After file is completed played, it will once again check the trigger. if the signal is still low then it will repeat the playback. If during playing of a file, it finds a new trigger then it will stop playing current file and start playing the new trigger file.

### LED behavior

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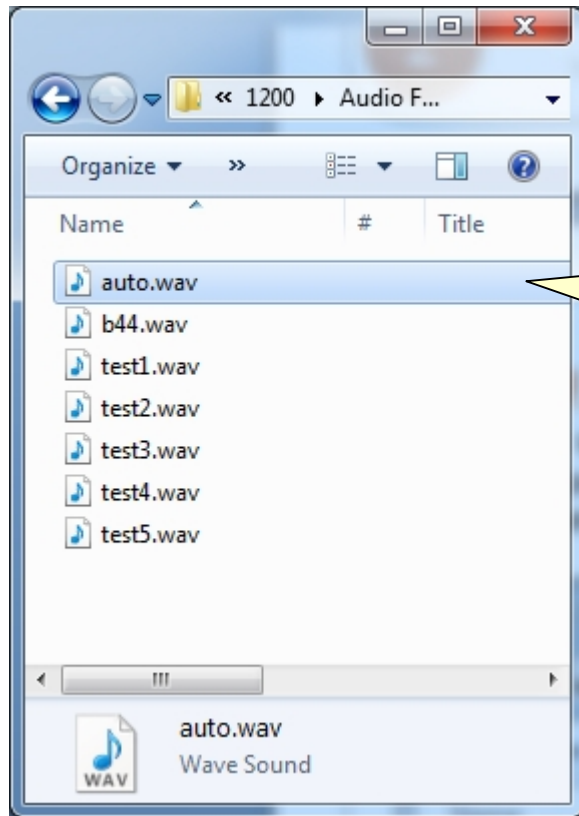
There are three LEDs on Board

- Green LED is power LED indicating board is getting power
- Yellow LED is status LED indicating if board is currently playing file or not.
- Red LED is error LED. It will come on when it has errors like below
  - 1) it does not find SD card at power up
  - 2) if SD card is not readable or not formatted
  - 3) Playing of file failed since it might not exists on memory card

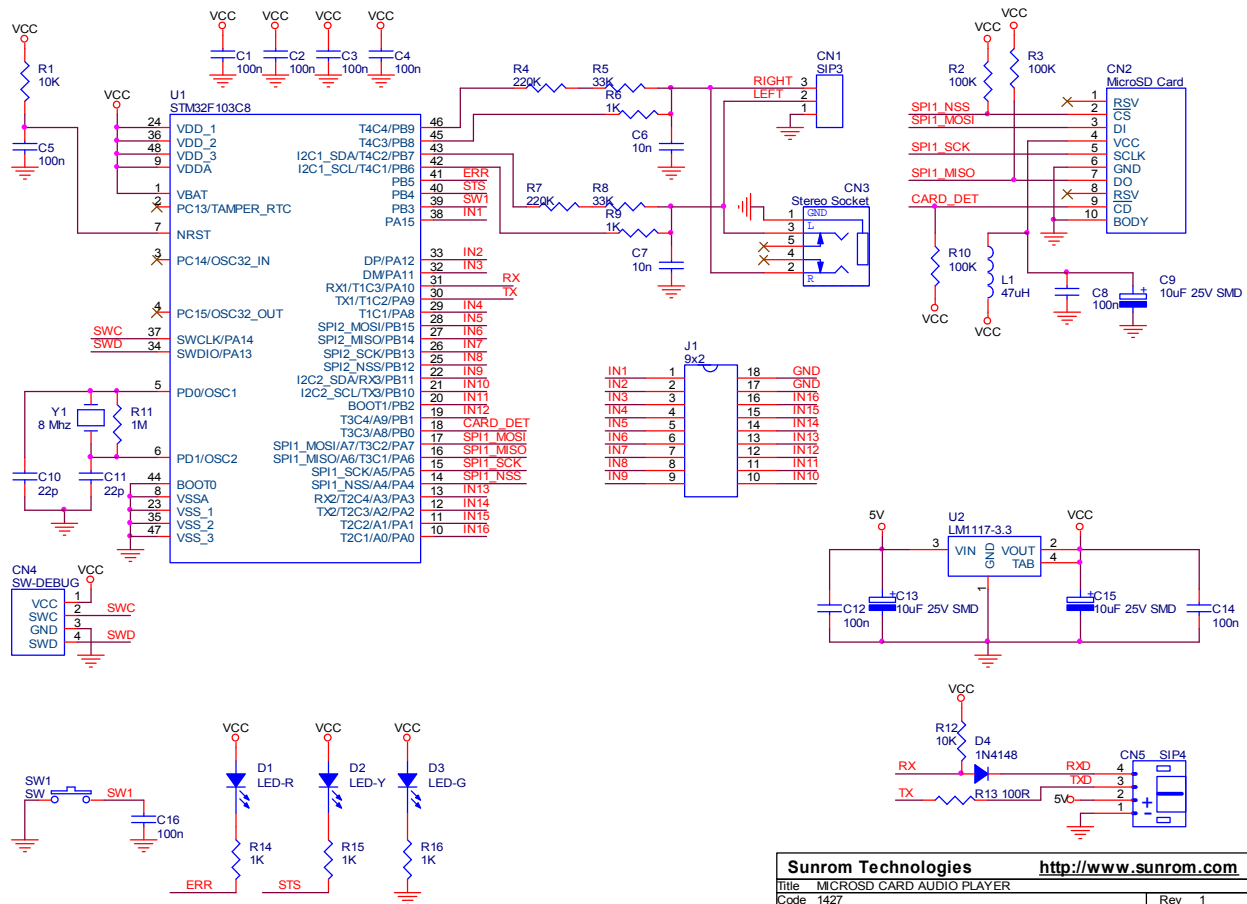
### Managing wav files on memory card

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To manage wav files on memory card you can get any low cost memory card reader available in IT or mobile spares shop. Insert card into it and plug it into PC like pen drive. When you insert your SD card into memory reader on PC you can view the files. Once you have put all required WAV files you can put that card in player. Make sure to put SD card before powering up board.



## Board Schematic

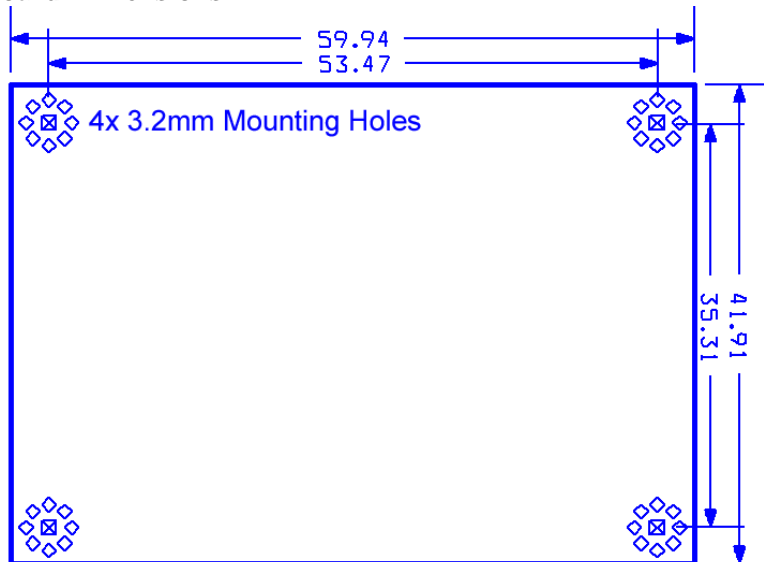


**Sunrom Technologies** <http://www.sunrom.com>  
 Title: MICROSD CARD AUDIO PLAYER  
 Code: 1427  
 Date: Thursday, June 23, 2016  
 Rev: 1  
 Sheet 1 of 1



## Product Dimensions

### Board Dimensions in mm



## Frequently Asked Questions

### How to play MP3 files?

Board only supports WAV file format. MP3 is a compress format and it will be required to be converted to uncompress WAV files. There will be no loss of quality during this. You can use any free software to do this conversion.

### How to amplify Audio

The audio from board is at headphone level only. You should add a external audio amplifier like LM386 or best way is to use a easily available PC Desktop Speaker system. The stereo pin from that can go to the player board instead of PC giving excellent sound output.

### Can I connected to Arduino or any controller

Yes you can through UART or Trigger Interface.

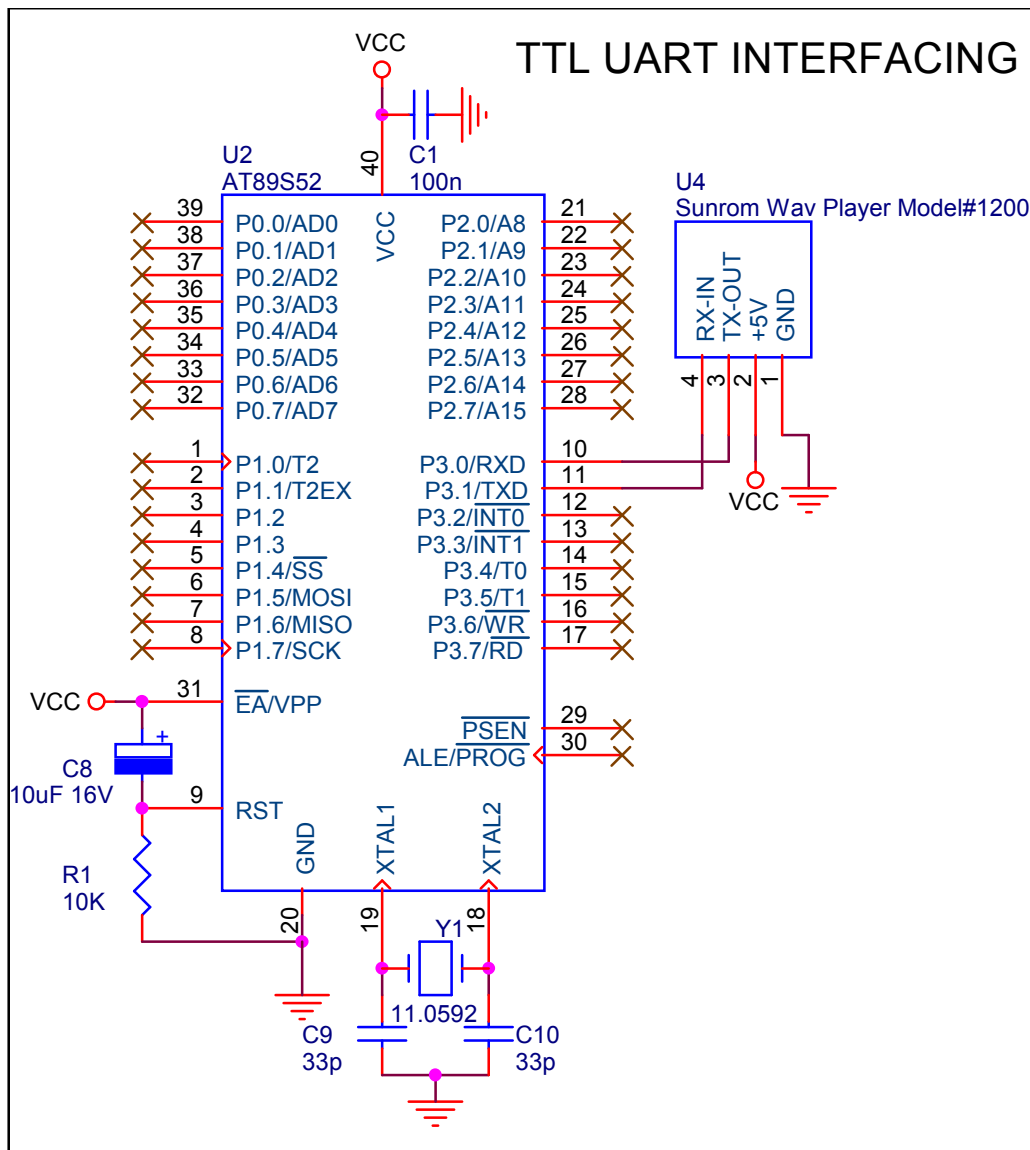
## Interfacing with microcontroller

It's very easy to interface with microcontroller having UART at 3V or 5V level. Configure your microcontroller to communicate at 9600 baud rate.

To play a particular wav file send Ascii string in following format. Note the string starts with command character(P) and end with CR (Carriage return, '\r', 0x0D, 13 in decimal).

```
printf("Ptest\r"); // Play test.wav file from SD memory card
```

Before approaching to this, we recommend you try on PC first with terminal software.



The source code for this demo application is on next page.

In Keil C51 compiler you can write simple code as below to play test.wav file

```
#include <REGX51.H>
#include <stdio.h> // for printf

// =====
// ===== Setup Serial port for printf =====
// =====
void init_serial( void )
{
    //9600 bps @ 11.059 MHz
    SCON = 0x50; /* Setup serial port control register */
    /* Mode 1: 8-bit uart var. baud rate */
    /* REN: enable receiver */
    PCON &= 0x7F; /* Clear SMOD bit in power ctrl reg */
    /* This bit doubles the baud rate */
    TMOD &= 0xCF; /* Setup timer/counter mode register */
    /* Clear M1 and M0 for timer 1 */
    TMOD |= 0x20; /* Set M1 for 8-bit autoreload timer */
    TH1 = 0xFD; /* Set autoreload value for timer 1 */
    /* 9600 baud with 11.0592 MHz xtal */
    TR1 = 1; /* Start timer 1 */
    TI = 1; /* Set TI to indicate ready to xmit */
}

// =====
// ===== Delay x ms =====
// =====
void delay_ms(int x) // delays x msec (at fosc=11.0592MHz)
{
    int j=0;
    while(x>=0)
    {
        for (j=0; j<100; j++);
        x--;
    }
}

// =====
// ===== Main =====
// =====
void main()
{
    delay_ms(100); // power stabilize

    init_serial(); // setup C51 serial port

    printf("Ptest\r"); // Play test.wav file

    while(1)
    {
    }
}
```

## Support

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Sunrom Electronics offers free **technical support** ([www.sunrom.com/contact](http://www.sunrom.com/contact)) for customers, until the end of the product's lifetime, so if something goes wrong, we're ready and willing to help!

Technical Support is available by email only and scope is limited to problem faced during use of the use of product and does not cover end user programming and hardware troubleshooting.

Each product passes through strict quality checks before it reaches you. So if something is not working out right, the first thing to doubt is the connections or programming of your hardware.

## Disclaimer

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