

# **AT89C51SND1 Development Board**

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## **User Guide**





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# Section 1

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## Introduction

The AT89C51SND1 development board is part of the AT89C51SND1 starter kit.

This document is the user's guide of the AT89C51SND1 development board, its goal is to give user an overview of the board's hardware.

The AT89C51SND1 development board has been designed to demonstrate the AT89C51SND1's capability to support the following features:

- MP3 song playing
- Voice recording/playing
- MultiMedia Card® with FAT16
- USB mass storage
- USB firmware upgrade
- Serial DataFlash® Storage Memory

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- |            |                   |                                                                                                                                                                 |
|------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.1</b> | <b>References</b> | <ul style="list-style-type: none"> <li>■ AT89C51SND1 Complete Datasheet</li> <li>■ AT89C51SND1 Summary Datasheet</li> <li>■ AT89C51SND1 Errata Sheet</li> </ul> |
|------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

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- |            |                      |                                                                                                                                                                                                                                       |
|------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.2</b> | <b>Abbreviations</b> | <ul style="list-style-type: none"> <li>■ MP3: MPEG layer 3</li> <li>■ MMC: MultiMedia Card</li> <li>■ USB: Universal Serial Bus</li> <li>■ FAT: File Allocation Table</li> <li>■ DataFlash®: Atmel on-board Flash memories</li> </ul> |
|------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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- |            |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1.3</b> | <b>Additional Resources</b> | <ul style="list-style-type: none"> <li>■ Flexible In-System Programming (FLIP) software – FLIP software can be downloaded from Atmel site. FLIP is available for both Windows® and Linux®. FLIP allows to perform In-System Programming from a PC.</li> <li>■ Updating Firmware – Firmware can be updated by contacting Atmel Technical Sales Support.</li> <li>■ Product Information – All updated product information can be retrieved at the Atmel Web Site, <a href="http://www.atmel.com">www.atmel.com</a>.</li> </ul> |
|------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



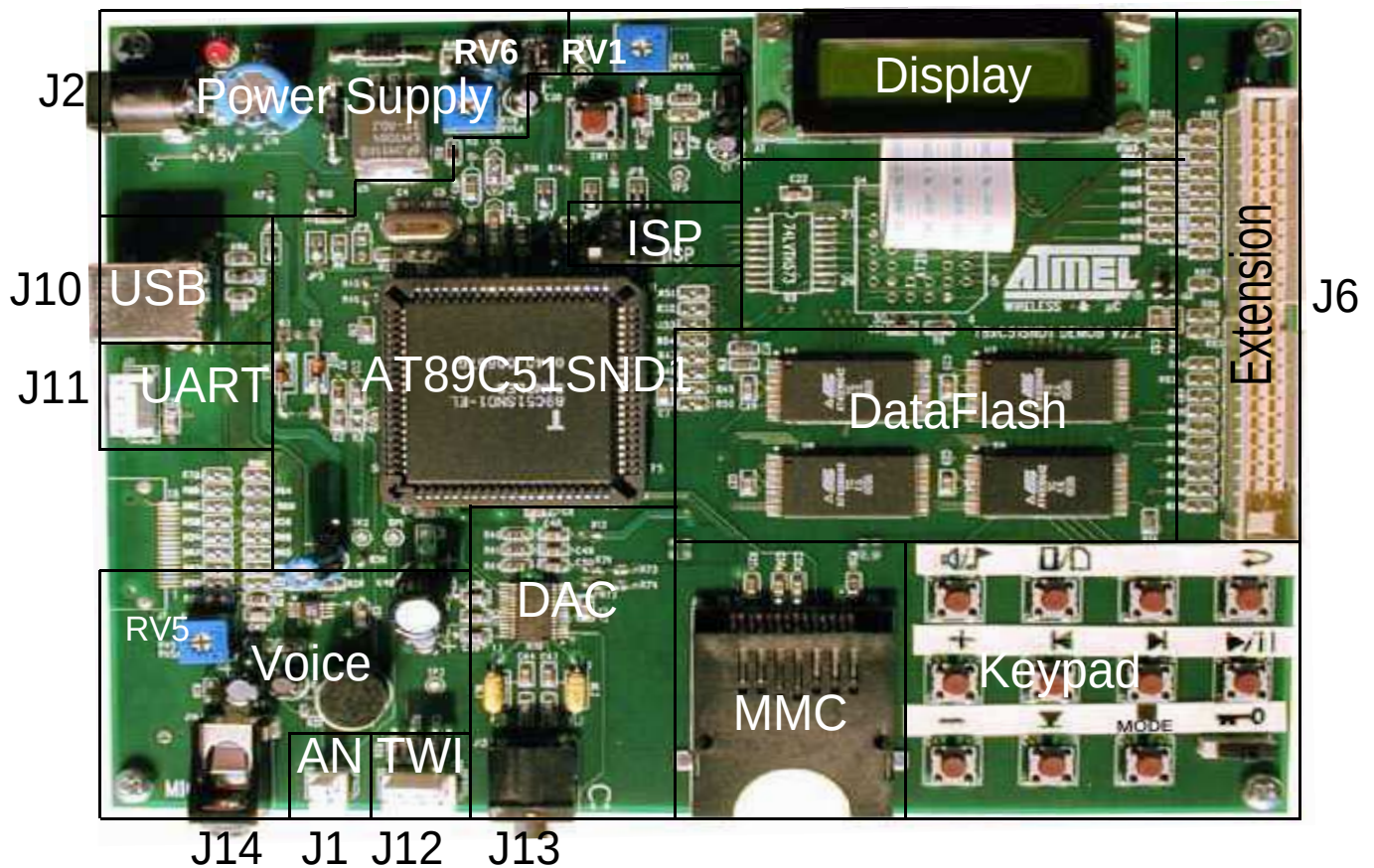
## Section 2

# AT89C51SND1 Development Board

### 2.1 Board Description

Figure 2-1 shows the V2.2 development board and its different functional areas. These areas are detailed in the following sections.

**Figure 2-1.** Development Board



#### 2.1.1 Power Supply Area

The board is powered by  $5V \pm 10\%$ . This voltage is necessary for the LCD display. An on-board regulator delivers 3V voltage, adjustable using RV6, for the rest of the board. Figure 2-2 shows the power supply connector pinout. Table 1 gives its pin assignment.

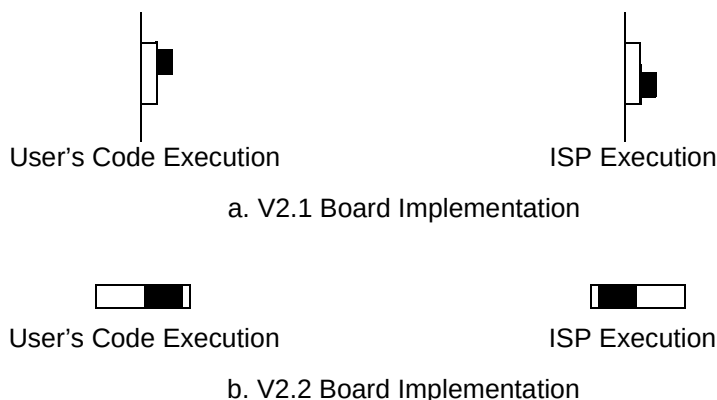
**Figure 2-2.** J2 Connector



**Table 1.** J2 Pinout

| Pin Number | Pin Assignment            |
|------------|---------------------------|
| 1          | PS (+5V supply voltage)   |
| 2          | GND (0V supply reference) |

- 2.1.2 AT89C51SND1 Area** The AT89C51SND1 area consists of the AT89C51SND1 product along with the following items:
- Reset Circuit
  - 16 MHz Oscillator
  - PLL Filter
  - Analog Reference Circuit
- 2.1.3 Keypad Area** The keypad area consists of a 4 by 3 matrix with one key replaced by a “Keypad Lock” switch.
- 2.1.4 Display Area** The display area consists of a 2-line by 16 characters LCD display. The contrast is adjustable using RV1 variable resistor.
- 2.1.5 DAC Area** The DAC area consists of a standard audio DAC embedding the headphone amplifier. The headphone connector is standard and allows connection of all headphone types.
- 2.1.6 In-System Programming (ISP) Area** The ISP area contains a switch that allows the user to select the AT89C51SND1 hardware condition and thus execute the embedded bootloader or to run the client application. Note that on V2.1 board, the switch is located on the right side of the board near J6 connector. Figure 2-3 shows the switch position to enter ISP mode.

**Figure 2-3.** ISP Switch Position

- 2.1.7 DataFlash Area** The DataFlash area consists of the on-board Flash memory. It is composed of four AT45DB642 giving 32-Mb for the V2.2 board or four AT45DB321 giving 16-Mb for the V2.1 board.
- 2.1.8 MultiMedia Card (MMC) Area** The MultiMedia Card area consists of a 2-slot connector that allows the plug-in of two MMC cards simultaneously.
- 2.1.9 USB Area** The USB area consists of a standard USB type B receptacle for the V2.2 board while V2.1 is equipped with a mini but non-standard connector. USB is used for two different tasks:
- Firmware upgrade for In-System Programming.



- Mass storage for song downloading or uploading.

The board is delivered with a USB cable.

### 2.1.10 Voice Area

The voice area consists of an electret type microphone along with a preamplifier to adapt the level to the AT89C51SND1 ADC input. Gain is adjustable using RV5. A mono jack connector allows connection of an external electret type microphone. Figure 2-4 shows the external microphone connector pinout while Table 2 gives its pin assignment.

**Figure 2-4.** J14 Male Connector

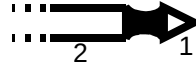


**Table 2.** J14 Pinout

| Pin Number | Pin Assignment                                                                      |
|------------|-------------------------------------------------------------------------------------|
| 1          | Microphone input signal. This input is polarized through a 2.2 k $\Omega$ resistor. |
| 2          | AVREFN (Analog 0V reference signal)                                                 |

### 2.1.11 Two Wire Interface (TWI) Area

The TWI area consists of a 4-pin extension connector implemented to support and power TWI devices. Figure 2-5 shows the external microphone connector pinout while Table 3 gives its pin assignment.

**Figure 2-5.** J12 TWI Extension Connector

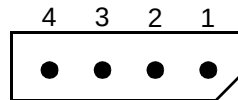


**Table 3.** J12 Pinout

| Pin Number | Pin Assignment   |
|------------|------------------|
| 1          | VDD (Digital 3V) |
| 2          | VSS (Digital 0V) |
| 3          | SCL              |
| 4          | SDA              |

### 2.1.12 UART Area

The UART area consists of a 4-pin extension connector implemented to support and power RS232 or other interface drivers. Figure 2-6 shows the UART extension connector pinout while Table 4 gives its pin assignment.

**Figure 2-6.** J11 UART Extension Connector

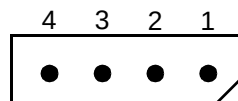


**Table 4.** J11 Pinout

| Pin Number | Pin Assignment |
|------------|----------------|
| 1          | VDD (3V)       |
| 2          | VSS (0V)       |

Table 4. J11 Pinout (Continued)

| Pin Number | Pin Assignment        |
|------------|-----------------------|
| 3          | RXD (3V logic signal) |
| 4          | TXD (3V logic signal) |

2.1.13 Analog (AN) Area

The AN area consists of a 2-pin analog extension connector. It allows direct connection to the AT89C51SND1 AIN0 input. It can be used, for example, to monitor a battery level or to connect a remote control located on the headphone cable. Figure 2-7 shows the UART extension connector pinout while Table 5 gives its pin assignment.

Figure 2-7. J1 Analog Extension Connector

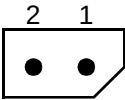


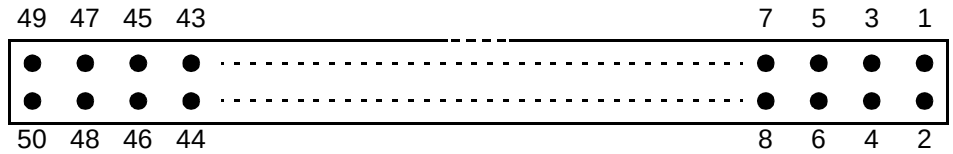
Table 5. J1 Pinout

| Pin Number | Pin Assignment                      |
|------------|-------------------------------------|
| 1          | 3V max analog input                 |
| 2          | AVREFN (Analog 0V reference signal) |

### 2.1.14 Extension Area

The Extension area consists of a 50-pin connector implemented to support extension cards such as IDE adapter.

**Figure 2-8.** J6 Extension Connector



| Pin Number | Pin Assignment | Pin Number | Pin Assignment        |
|------------|----------------|------------|-----------------------|
| 1          | A8             | 2          | NC                    |
| 3          | A9             | 4          | NC                    |
| 5          | A10            | 6          | NC                    |
| 7          | A11            | 8          | NC                    |
| 9          | A12            | 10         | NC                    |
| 11         | A13            | 12         | NC                    |
| 13         | A14            | 14         | NC                    |
| 15         | A15            | 16         | NC                    |
| 17         | ALE            | 18         | NC                    |
| 19         | RST            | 20         | VSS                   |
| 21         | NC             | 22         | VSS                   |
| 23         | WR#            | 24         | NC                    |
| 25         | RD#            | 26         | NC                    |
| 27         | NC             | 28         | VSS                   |
| 29         | CLK            | 30         | VSS                   |
| 31         | NC             | 32         | NC                    |
| 33         | ISP#           | 34         | NC                    |
| 35         | AD7            | 36         | NC (V2.1) / A7 (V2.2) |
| 37         | AD6            | 38         | NC (V2.1) / A6 (V2.2) |
| 39         | AD5            | 40         | NC (V2.1) / A5 (V2.2) |
| 41         | AD4            | 42         | NC (V2.1) / A4 (V2.2) |
| 43         | AD3            | 44         | NC (V2.1) / A3 (V2.2) |
| 45         | AD2            | 46         | NC (V2.1) / A2 (V2.2) |
| 47         | AD1            | 48         | NC (V2.1) / A1 (V2.2) |
| 49         | AD0            | 50         | NC (V2.1) / A0 (V2.2) |



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