



A132000

ADPCM SOUND CONTROLLER

Preliminary

Document Title

ADPCM SOUND CONTROLLER

Revision History

| <u>Rev. No.</u> | <u>History</u> | <u>Issue Date</u> | <u>Remark</u> |
|------------------------|-----------------------|--------------------------|----------------------|
| 0.0 | Initial issue | December 14, 1999 | Preliminary |



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General Description

The A132000 is a fully CMOS integrated circuit. It uses advanced design and process technology to combine an 8-bit RISC processor with program/data ROM, 80-byte working SRAM, timer/counter, I/O, built-in oscillator and audio current mode D/A. The high speed RISC processor can implement software based audio processing, data compression, LCD display, functional control and others.

Features

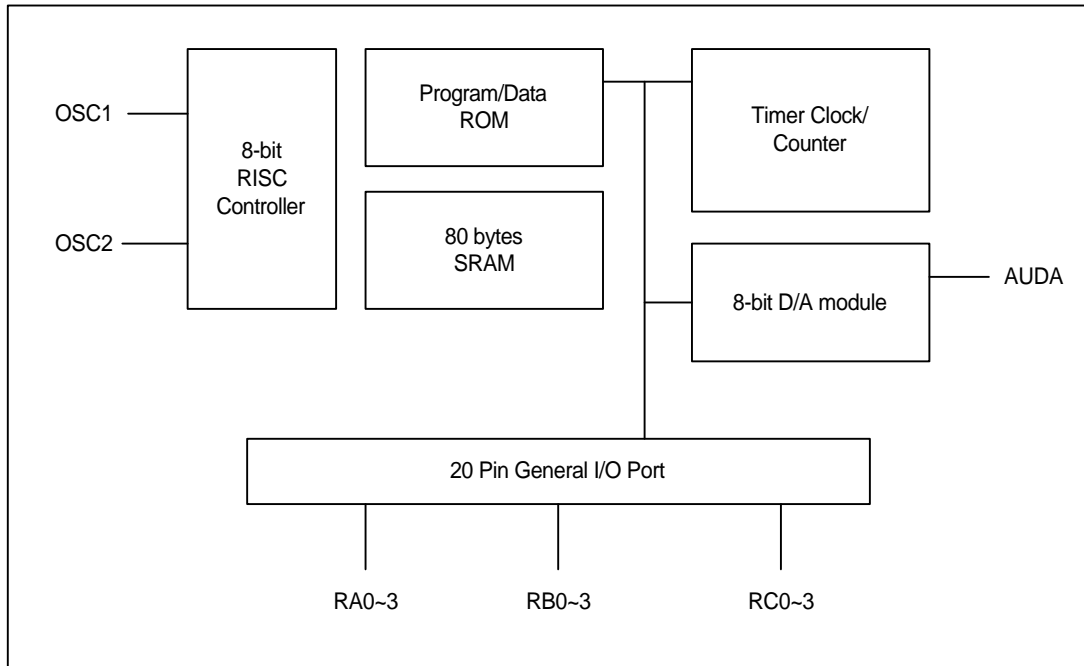
- 8-bit RISC controller
- Provide 2Mbit ROM area
- Provide maximum 2K bytes ROM area for program data
- 80bytes working SRAM
- Audio output, audio output current: 5 mA
- 8-bit timer/counters with 8-bit programmable prescaler
- Provide 8-bit current output D/A
- Provide 20 general I/Os
- Provide 4 output only drive LEDs
- Key wake up function
- Low voltage reset function
- Crystal Operation or Built-in 4M Hz RC-Oscillator Operation
- ESD, insensitive
- Two-level hardware push/pop stack
- Only 33 single word instruction to learn
- Wide operation range:2.7V-5.5V
- Software audio for speech and melody
- Provide 60 seconds playing of audio or speech voice
- Built-in watch dog timer
- Clock stop mode
- ADPCM encoding/decoding method
- Power-On Reset (POR)

Application Field

- Intelligent education toys
ex. Pattern to voice (animal, car, color etc.)
- Spelling (A,B,C or Chinese)
- Math game
- High-end toy controller
- Talking instrument controller
- General speech synthesizer
- Industrial controller

Package Type

- Dice Form

Block Diagram

Pin Description

| Symbol | I/O | Function |
|---------------|------------|--|
| VCC | I | Positive Power Supply |
| VSS | I | Negative Power Supply |
| OSC1/CLKIN | I | Oscillator Crystal Input / External Clock Source Input (Crystal Mode) / External resistor Input (RC Mode). |
| OSC2/CLKOUT | I | Oscillator Crystal Output. |
| T0CKI | I | Clock Input to Timer0. Must tied to VSS or VCC if not in use |
| MCLRB | I | Master Clear Input. The pin active low reset to the device |
| RA0 ~ RA3 | I/O | Bi-directional I/O port, Wakeup (Pad Option) |
| RB0 ~ RB7 | I/O | Bi-directional I/O port |
| RC0 ~ RC7 | I/O | Bi-directional I/O port |
| AUDA | O | Audio output |
| OPRA0 ~ OPRA3 | I | For RA0 ~ RA3 Wakeup Enable Option / Default = 1 (Enable) |
| CLKOP | I | 1: (RC-OSC Mode) 0: (XTAL Mode) / Default = 1 (RC-OSC Mode) |
| TESTB | I | Reserved for Testing Mode |
| TSIN | I | Reserved for Testing Mode |
| TSOUT | O | Reserved for Testing Mode |
| TS1~TS0 | I | Reserved for Testing Mode |

Absolute Maximum Ratings

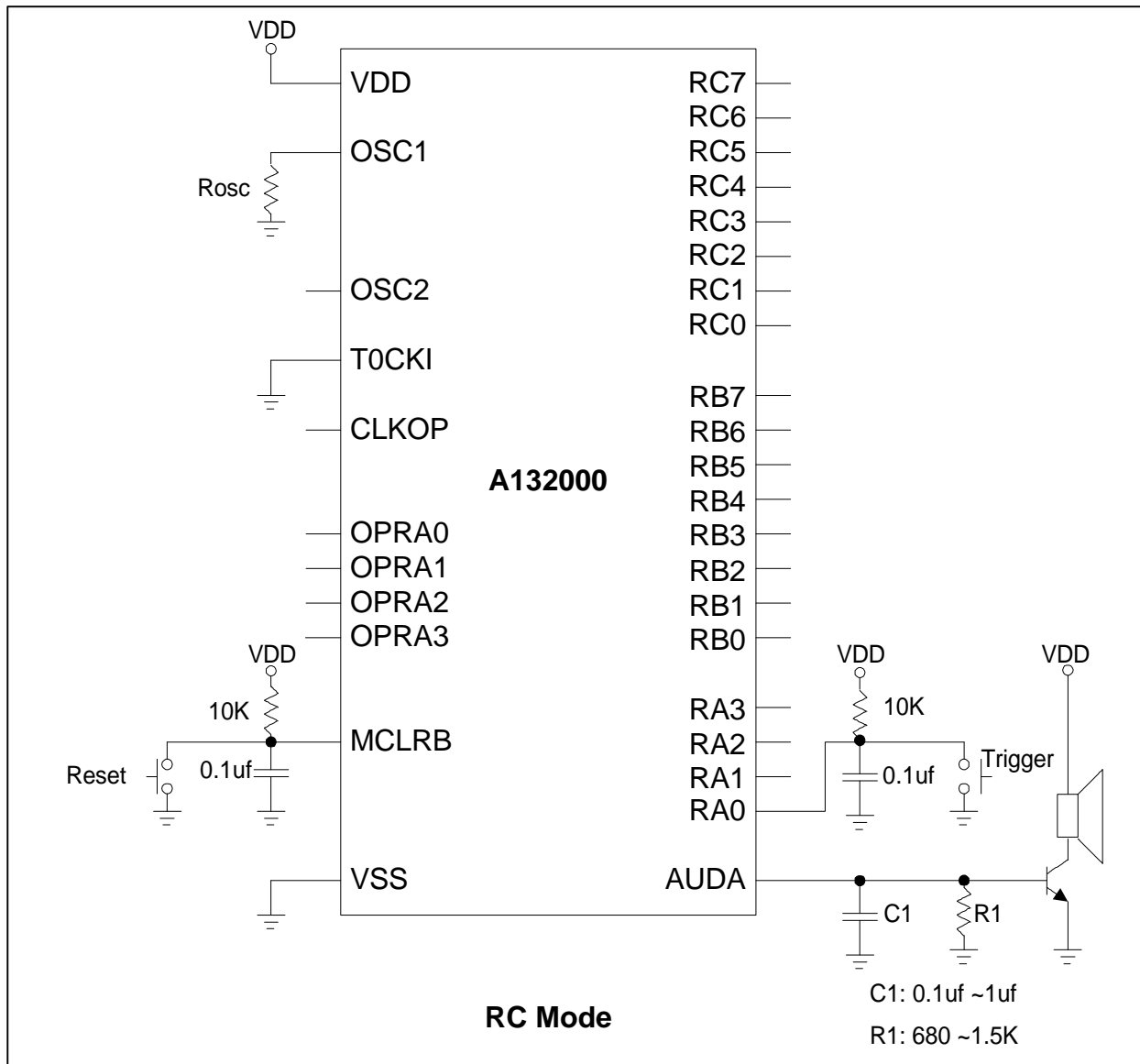
| Characteristics | Symbol | Min. | Max. | Unit |
|---------------------------|-----------------------------------|-----------------------|-----------------------|------|
| Operating Temperature | Top | 0 | 70 | °C |
| Storage Temperature Range | Ts | -55 | +125 | °C |
| Input Voltage | V _{DD} / V _{SS} | V _{DD} - 0.5 | V _{DD} + 0.5 | V |
| Supply Voltage | V | -0.5 | +6.0 | V |

Electrical Characteristics

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | Condition |
|----------------------------|-------------------|-----------------------|------|----------------------|------|------------------------------|
| Operating Voltage | V _{DD} | 2.7 | | 5.5 | V | |
| Standby Current | I _{DDs} | | | 10.0 | μA | V _{DD} = 5V |
| Operating Current | I _{DDO} | | | 10.0 | mA | V _{DD} = 5V No Load |
| Input Low Voltage | V _{IL} | 0 | | 0.8 | V | |
| Input High Voltage | V _{IH} | 2.4 | | V _{DD} +0.2 | V | |
| Output Low Voltage | | | | | | V _{DD} = 5V |
| RC4-RC7 | V _{OL} | | | 0.6 | V | I _{OL} = 12mA |
| RA,RB,RC0-RC3 | V _{OL} | | | 0.6 | V | I _{OL} = 2mA |
| Output High Voltage | | | | | | V _{DD} = 5V |
| RC4-RC7 | V _{OH} | V _{DD} -0.7V | | | V | I _{OH} = -12mA |
| RA,RB,RC0-RC3 | V _{OH} | V _{DD} -0.7V | | | V | I _{OH} = -2mA |
| Output Current of AUDA | I _{AUDA} | | | 5.0 | mA | V _{DD} = 5V |
| Oscillation Resistor | R _{osc} | 8 | | 10 | KΩ | V _{DD} = 5V |
| RC-Oscillator Frequency | F _{osc} | | 4 | | MHz | V _{DD} = 5V |

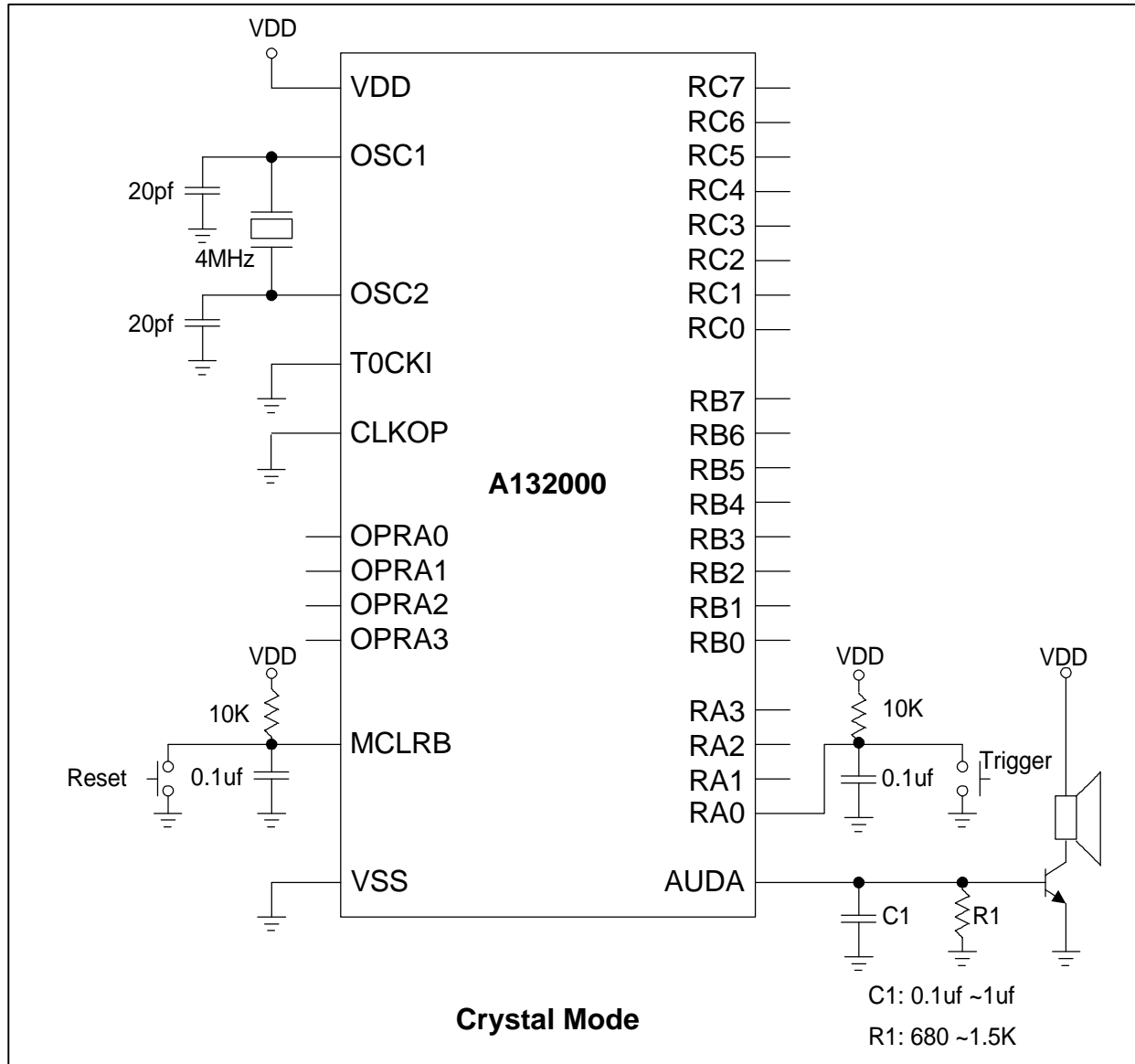
Application Circuits

RC Operating Mode Application Circuit



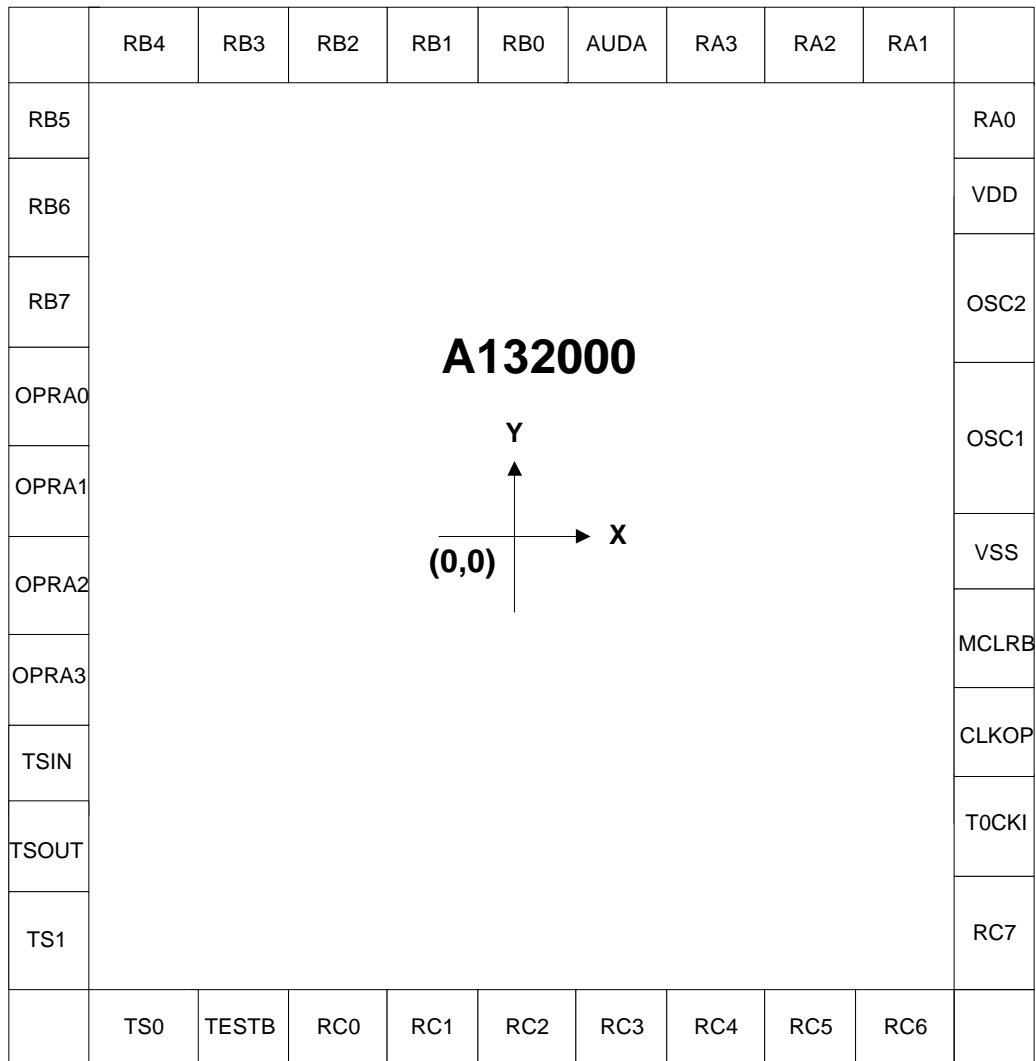
Application Circuits (Continued)

Crystal Operating Mode Application Circuit



Ordering Information

| Part No. | Package |
|----------|-----------|
| A132000H | Chip Form |

Pad Diagram


Chip Size: 2820 um * 2820um

This IC substrate should be connected to VSS

Pad Locations

| Symbol | X | Y |
|---------------|----------|----------|
| RA0 | +1315.7 | +1095.7 |
| VDD | +1315.7 | +873.1 |
| OSC2 | +1315.7 | +635.97 |
| OSC1 | +1315.7 | +81.4 |
| VSS | +1315.7 | -141.2 |
| MCLRB | +1315.7 | -392.4 |
| CLKOP | +1315.7 | -615.3 |
| T0CKI | +1315.7 | -866.2 |
| RC7 | +1315.7 | -1088.8 |
| RC6 | +943.9 | -1414.6 |
| RC5 | +721.3 | -1414.6 |
| RC4 | +470.1 | -1414.6 |
| RC3 | +247.5 | -1414.6 |
| RC2 | -6.0 | -1414.6 |
| RC1 | -226.3 | -1414.6 |
| RC0 | -479.9 | -1414.6 |
| TESTB | -700.1 | -1414.6 |
| TS0 | -951.3 | -1414.6 |
| TS1 | -1315.7 | -1070.9 |
| TSOUT | -1315.7 | -819.7 |
| TSIN | -1315.7 | -597.1 |
| OPRA3 | -1315.7 | -345.9 |
| OPRA2 | -1315.7 | -123.3 |
| OPRA1 | -1315.7 | +127.9 |
| OPRA0 | -1315.7 | +350.5 |
| RB7 | -1315.7 | +601.7 |
| RB6 | -1315.7 | +824.3 |
| RB5 | -1315.7 | +1075.5 |
| RB4 | -951.3 | +1414.6 |
| RB3 | -700.1 | +1414.6 |
| RB2 | -477.5 | +1414.6 |
| RB1 | -226.3 | +1414.6 |
| RB0 | -3.7 | +1414.6 |
| AUDA | +247.5 | +1414.6 |
| RA3 | +470.1 | +1414.6 |
| RA2 | +721.3 | +1414.6 |
| RA1 | +943.9 | +1414.6 |