



AX1002 8-bit CMOS Microcontroller

CPU FEATURES

- High performance 8-bit RISC-based CPU
- Operating speed: DC – 100MHz (100MIPS max.)
- Compact instruction set. A total of 79 instructions
- All instructions are single cycle except branch instructions, IREAD/IREADI and IWRITE/IWRITEI
- Special I-Instruction for memory access
 - IREAD/IREADI: Fast Table lookup capability through run-time readable code in instruction memory and OTP program memory
 - IWRITE/IWRITEI: Real time instruction write to instruction memory
- Fast interrupt response 30ns internal interrupt response at DC - 100MHz
- Eight level deep hardware stack for subroutine linkage
- Two levels interrupt priority selection for all the hardware interrupt sources
- Support stack value control by push/pop in interrupt service routine
- Support extended level subroutine linkage by software jump using data memory
- Multiple sources of Vectored interrupt capability
- Full speed USB 2.0 device controller and PHY module
- IrDA module supports IrDA interface or UART interface. Support up to 4Mbit/s bit rate for IrDA mode, up to 3.686Mbit/s (32X115.2Kbit/s) bit rate for UART mode.
- 8 channels ADC with 10-bit resolution. Max 83Ksps conversion rate
- SSP module supports SPI mode, PCM mode and I²S mode

Memory

- Low power CMOS One-Time-Programming (OTP) technology
- Instruction -- 8K x 8-bit OTP + 4Kx16-bit RAM
- Data -- 256 bytes RAM + 4K x 16-bit RAM
- Support Direct, Indirect addressing modes
- Provide two pointers for Indirect addressing
- Strong program code protection
- Dedicated 32 bytes ROM space for product ID record
- All registers are memory-mapped

Interrupt Capability

- 16 Vectored Interrupts
- Timer0, Timer1 and Timer2 overflow interrupt capability
- CCP1, CCP2 interrupt capability
- Watchdog Timer overflow interrupt capability
- Five external single-pin wakeup / interrupt capability on Port A (RA3, RA4, RA5, RA6, RA7)
- Two groups external multi-pins wakeup / interrupt capability on Port B. (Each group contain 4 pins)
- USB, IrDA, ADC. SSP interrupt capability
- Software interrupt capability

Frequency and Power management

- Provide two power saving modes: hold mode and sleep mode
- Provide two clock mode for system operation: OSC mode, PLL mode
- Support system clock switching from 32KHz to 100MHz
- USB clock adjusting mechanism allows system operate at 48MHz/96MHz/144MHz when employing USB



Flexible I/O

- 3 ports GPIO (8 pins on each port) and a half port GPIO (4 pins)
- All pins can be individually programmable as I/O
- Inputs are TTL level
- All ports are internal pull-up and pull-down selectable
- All ports have Schmitt Trigger input
- All ports are slew rate control selectable
- Programmable Sink/Source Current with values of 10mA and 24mA
- Timer0/Timer1/Timer2 MUXed with Port B, Port C and Port D to support Capture/Compare/PWM mode.
- IrDA MUXed with Port A to support IrDA or UART interface (RA0 ITXD, RA4 IRXD).
- Analog comparator support on Port A (RA5 COUT, RA6 INP, RA7 INN).
- 8 channels ADC MUXed with PORT B.
- A configurable Flip Flop MUXed with PORT C.
- Full Port Flip Flops MUXed with PORT B and RA3.

Peripheral Features

- Timer0: 8-bit timer/counter with 12-bit prescaler
- Timer1: 16-bit timer/counter with 12-bit prescaler
- Timer2: 8-bit timer with 8-bit period register, 12-bit prescaler and 4-bit postscaler
 - Timer0/Timer1/Timer2 supporting:
 - ☞ Timer mode
 - ☞ Counter mode
 - ☞ Capture/Compare/PWM mode
- Watchdog Timer with on-chip 32KHz RC oscillator
- Analog Comparator module
- Power-On Reset
- Brown-Out Reset
- Single-Pin Wakeup logic on Port A pins
- Multi-Pins Wakeup logic on Port B
- Full speed USB 2.0 device controller and PHY module
- IrDA module supports IrDA interface or UART interface. Support up to 4Mbit/s bit rate for IrDA mode, up to 3.686Mbit/s (32X115.2Kbit/s) bit rate for UART mode.
- SSP module supports SPI mode, PCM mode and I²S mode.
- Software UART, SPI, I2S and other serial protocols.
- Software Modem.

Packages

- TSOP48
- LQFP64

Programming and Debugging Support

- On-chip Serial In-System Programming support
- On-chip In-System debugging support
- In-System Serial Programming via two dedicated pins: ISPDP1 pin, ISPDP2 pin. High voltage pin V_{pp} is used for high voltage programming voltage
- Support a serial Read-OTP mode, allow read out the top 32 bytes of the ROM (OTP), which recorded the product information by user programming.