

Features

- High-performance, Low-power Atmel® AVR® 8-bit Microcontroller
- Advanced RISC Architecture
 - 133 Powerful Instructions – Most Single Clock Cycle Execution
 - 32 x 8 General Purpose Working Registers + Peripheral Control Registers
 - Fully Static Operation
 - Up to 16MIPS Throughput at 16MHz
 - On-chip 2-cycle Multiplier
- High Endurance Non-volatile Memory segments
 - 128Kbytes of In-System Self-programmable Flash program memory
 - 4Kbytes EEPROM
 - 4Kbytes Internal SRAM
 - Write/Erase cycles: 10,000 Flash/100,000 EEPROM
 - Data retention: 20 years at 85°C/100 years at 25°C⁽¹⁾
 - Optional Boot Code Section with Independent Lock Bits
 - In-System Programming by On-chip Boot Program
 - True Read-While-Write Operation
 - Up to 64Kbytes Optional External Memory Space
 - Programming Lock for Software Security
 - SPI Interface for In-System Programming
- QTouch® library support
 - Capacitive touch buttons, sliders and wheels
 - QTouch and QMatrix acquisition
 - Up to 64 sense channels
- JTAG (IEEE std. 1149.1 Compliant) Interface
 - Boundary-scan Capabilities According to the JTAG Standard
 - Extensive On-chip Debug Support
 - Programming of Flash, EEPROM, Fuses and Lock Bits through the JTAG Interface
- Peripheral Features
 - Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes
 - Two Expanded 16-bit Timer/Counters with Separate Prescaler, Compare Mode and Capture Mode
 - Real Time Counter with Separate Oscillator
 - Two 8-bit PWM Channels
 - 6 PWM Channels with Programmable Resolution from 2 to 16 Bits
 - Output Compare Modulator
 - 8-channel, 10-bit ADC
 - 8 Single-ended Channels
 - 7 Differential Channels
 - 2 Differential Channels with Programmable Gain at 1x, 10x, or 200x
 - Byte-oriented Two-wire Serial Interface
 - Dual Programmable Serial USARTs
 - Master/Slave SPI Serial Interface
 - Programmable Watchdog Timer with On-chip Oscillator
 - On-chip Analog Comparator
- Special Microcontroller Features
 - Power-on Reset and Programmable Brown-out Detection
 - Internal Calibrated RC Oscillator
 - External and Internal Interrupt Sources
 - Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
 - Software Selectable Clock Frequency
 - ATmega103 Compatibility Mode Selected by a Fuse
 - Global Pull-up Disable
- I/O and Packages
 - 53 Programmable I/O Lines
 - 64-lead TQFP and 64-pad QFN/MLF
- Operating Voltages
 - 2.7 - 5.5V ATmega128L
 - 4.5 - 5.5V ATmega128
- Speed Grades
 - 0 - 8MHz ATmega128L
 - 0 - 16MHz ATmega128



8-bit Atmel Microcontroller with 128KBytes In-System Programmable Flash

ATmega128
ATmega128L

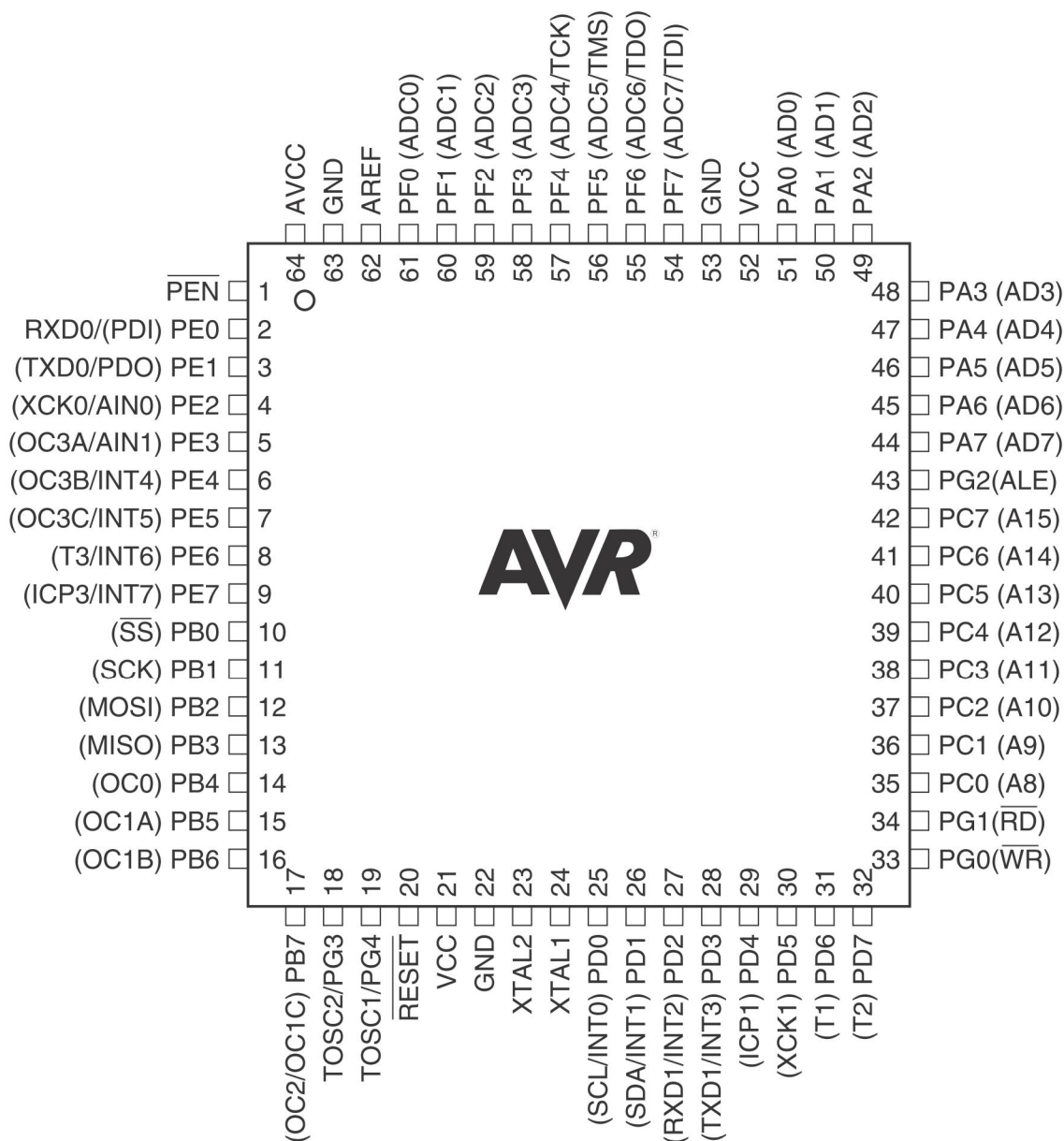
Summary

Rev. 2467XS-AVR-06/11



Pin Configurations

Figure 1. Pinout ATmega128



Note: The Pinout figure applies to both TQFP and MLF packages. The bottom pad under the QFN/MLF package should be soldered to ground.

Overview

The Atmel® AVR® ATmega128 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega128 achieves throughputs approaching 1MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

The diagram illustrates the internal architecture of the ATmega16 microcontroller, organized into several functional blocks and their interconnections:

- Power and Ground:** VCC and GND are connected to the top of the chip. AVCC, AGND, and AREF are connected to the bottom. XTAL1 and XTAL2 are connected to the right side, and RESET is connected to the bottom right.
- Ports:**
 - Port F (PF0 - PF7):** Includes PORTF DRIVERS, DATA REGISTER PORTF, and DATA DIR. REG. PORTF.
 - Port A (PA0 - PA7):** Includes PORTA DRIVERS, DATA REGISTER PORTA, and DATA DIR. REG. PORTA.
 - Port C (PC0 - PC7):** Includes PORTC DRIVERS, DATA REGISTER PORTC, and DATA DIR. REG. PORTC.
 - Port E (PE0 - PE7):** Includes PORTE DRIVERS, DATA REGISTER PORTE, and DATA DIR. REG. PORTE.
 - Port B (PB0 - PB7):** Includes PORTB DRIVERS, DATA REGISTER PORTB, and DATA DIR. REG. PORTB.
 - Port D (PD0 - PD7):** Includes PORTD DRIVERS, DATA REGISTER PORTD, and DATA DIR. REG. PORTD.
 - Port G (PG0 - PG4):** Includes PORTG DRIVERS, DATA REG. PORTG, and DATA DIR. REG. PORTG.
- Internal Components:**
 - ADC:** Analog-to-Digital Converter, connected to AVCC, AGND, and AREF.
 - WATCHDOG TIMER:** Connected to the MCU CONTROL REGISTER.
 - MCU CONTROL REGISTER:** Central control register.
 - TIMER/COUNTERS:** Connected to the MCU CONTROL REGISTER.
 - INTERRUPT UNIT:** Connected to the MCU CONTROL REGISTER.
 - EEPROM:** Connected to the MCU CONTROL REGISTER.
 - SPI:** Serial Peripheral Interface, connected to the MCU CONTROL REGISTER.
 - USART0 and USART1:** Universal Asynchronous Receiver/Transmitters, connected to the MCU CONTROL REGISTER.
 - TWO-WIRE SERIAL INTERFACE:** Connected to the MCU CONTROL REGISTER.
 - INTERNAL OSCILLATOR:** Connected to the MCU CONTROL REGISTER.
 - OSCILLATOR:** Connected to the MCU CONTROL REGISTER.
 - TIMING AND CONTROL:** Connected to the MCU CONTROL REGISTER.
 - STACK POINTER:** Connected to the MCU CONTROL REGISTER.
 - SRAM:** Static Random Access Memory, connected to the MCU CONTROL REGISTER.
 - GENERAL PURPOSE REGISTERS:** X, Y, and Z registers, connected to the MCU CONTROL REGISTER.
 - ALU:** Arithmetic Logic Unit, connected to the MCU CONTROL REGISTER.
 - STATUS REGISTER:** Connected to the MCU CONTROL REGISTER.
 - INSTRUCTION DECODER:** Connected to the MCU CONTROL REGISTER.
 - INSTRUCTION REGISTER:** Connected to the MCU CONTROL REGISTER.
 - PROGRAM FLASH:** Connected to the MCU CONTROL REGISTER.
 - PROGRAM COUNTER:** Connected to the MCU CONTROL REGISTER.
 - BOUNDARY-SCAN:** Connected to the MCU CONTROL REGISTER.
 - ON-CHIP DEBUG:** Connected to the MCU CONTROL REGISTER.
 - JTAG TAP:** Connected to the MCU CONTROL REGISTER.
 - PROGRAMMING LOGIC:** Connected to the MCU CONTROL REGISTER.
- Control Lines:** A set of control lines connecting the MCU CONTROL REGISTER to the various internal components.