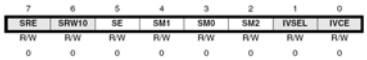
Sleep

Atmel ATmega128

Configuration

- MCUCR



SM2	SM1	SM0	Sleep Mode
0	0	0	Idle
0	0	1	ADC Noise Reduction
0	1	0	Power-down
0	1	1	Power-save
1	0	0	(reserved)
1	0	1	(reserved)
1	1	0	Standby
1	1	1	Extended Standby

- SLEEP instruction stops the CPU

Idle Mode

- peripherals keep running
  - SPI, USART, Analog Comparator, ADC, TWI, Timers/counters, Watchdog, Interrupts
  - technically: stops clk_{CPU}, clk_{FLASH}
- ADC will start once the CPU has been halted

ADC Noise Reduction Mode

- some peripherals keep running
  - ADC, External Interrupts, TWI address watch, Timer/Counter0, Watchdog
  - technically: stops clk_{CPU}, $clk_{I/O}$, clk_{FLASH}
- ADC will start once the CPU has been halted
- Waking interrupts
  - External Reset, Watchdog, Brown-out Reset
  - TWI address match
  - SPM/EEPROM ready
  - External Level IRQ 7:4, External IRQ 3:0
  - Timer/Counter0

Power-Down Mode

- only asynchronous modules keep running
  - External Interrupts, TWI address watch, Timer/Counter0, Watchdog
  - technically: stops all clocks
- Waking interrupts
  - External Reset, Watchdog, Brown-out Reset
  - TWI address match
  - External Level IRQ 7:4, External IRQ 3:0
- Wake-up period defined by CKSEL fuses

Power-save Mode

- nearly power-down, except:
  - if Timer/Counter0 is asynchronous, device can wake up from Timer Overflow or Output Compare
  - if Timer/Counter0 is NOT asynchronous, registers are undefined after wake-up
  - technically: stops all clocks except clk_{ASY}

Standby Mode

- nearly power-down, but
  - Oscillator is running
  - Device wakes up in 6 clock cycles

Extended Standby Mode

- nearly power-save, but
  - Oscillator is running
  - Device wakes up in 6 clock cycles

Summary

Table 18. Active Clock Domains and Wake Up Sources in the Different Sleep Modes

	Active Clock Domains					Oscillators		Wake Up Sources					
Sleep Mode	clk_{CPU}	clk_{FLASH}	clk_{IO}	clk_{ADC}	clk_{ASY}	Main Clock Source Enabled	Timer Osc Enabled	INT7:0	TWI Address Match	Timer 0	SPM/ EEPROM Ready	ADC	Other I/O
Idle			X	X	X	X	X(2)	X	X	X	X	X	X
ADC Noise Reduction				X	X	X	X(2)	X(3)	X	X	X	X	
Power-down								X(3)	X				
Power-save					X(2)		X(2)	X(3)	X	X(2)			
Standby(1)						X		X(3)	X				
Extended Standby(1)					X(2)	X	X(2)	X(3)	X	X(2)			

Notes: 1. External Crystal or resonator selected as clock source
2. If AS0 bit in ASSR is set
3. Only INT3:0 or level interrupt INT7:4