AVR306: Using the AVR® UART in C

Features

- **Setup and Use of the AVR UART**
- **Code Examples for Polled and Interrupt Controlled UART**
- **Compact Code**
- **C Code Included for AT90S8515**

Description

This application note describes how to set up and use the UART present in most AVR devices. C code examples are available for polled and interrupt controlled UART applications.

Polled UART

The application is continously checking the UDRE bit in the UART Status Register to control when the UART has finished sending a byte. When receiving data, the application is continously checking the RXC bit in the UART Status Register to control when the UART has completed receiving a byte.

Interrupt Controlled UART

The UART generates an interrupt when the UART has finished transmitting or receiving a byte. The interrupt handling routines uses modulo 2n addressing of circular buffers for buffering incoming and outgoing data. The buffer sizes must be defined before using the routines. Set the UART_RX_BUFFER_SIZE and UART_TX_BUFFER_SIZE variables to the buffer size in bytes. Note that these variables must be a power of 2. If not, a compiler error message will be flagged.

An extra function is addedta to the UART2 example code. The DataInReceiveBuffer returns zero if the receive buffer does not contain any data. This function does, in contrast to the ReceiveByte function, not wait for incoming data, but returns immediately the status of the buffer. Note: this routine does not return the number of bytes in the buffer.

Table 1. Properties of Polled/Interrupt Controlled UART Routines

Polled UART	Interrupt controlled UART
Compact code	Reasonable code size
Application busy while communicating	Application free while communicating

8-bit AVR® Microcontroller

Application Note

Rev. 1451B–AVR–07/02

Usage

Both examples use the same set of routines. If other devices than AT90S8515 is used, the include file in the code must be changed accordingly.

void InitUART
(unsigned char baudrate);

Enables the UART and sets the baud rate. Using baud rates that differs more than ±0.5% is not recommended. Please refer to the UART section in the data sheet for selecting the baud rate. The value passed to this function will be written to the UART Baud Rate Register.

unsigned char ReceiveByte
(void);

Waits for one byte to be received and returns it's value.

void TransmitByte
(unsigned char data);

Waits for transmission to be allowed, sends byte given as parameter to the UART transmitter and returns.

unsigned char
DataInReceiveBuffer
(void);

Returns zero (0) if the receive buffer is empty.

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1451B–AVR–07/02 0M