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 continuously 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 continuously 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 use 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 added 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

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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.
Atmel Headquarters

Corporate Headquarters
2325 Orchard Parkway
San Jose, CA 95131
TEL (408) 441-0311
FAX (408) 487-2600

Europe
Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
TEL (41) 26-426-5555
FAX (41) 26-426-5500

Asia
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimhatsui
East Kowloon
Hong Kong
TEL (852) 2721-9778
FAX (852) 2722-1369

Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL (81) 3-3523-3551
FAX (81) 3-3523-7581

Atmel Operations

Memory
2325 Orchard Parkway
San Jose, CA 95131
TEL (408) 441-0311
FAX (408) 436-4314

Microcontrollers
2325 Orchard Parkway
San Jose, CA 95131
TEL (408) 441-0311
FAX (408) 436-4314

La Chantrerie
BP 70602
44306 Nantes Cedex 3, France
TEL (33) 2-40-18-18-18
FAX (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards
Zone Industrielle
13106 Rouset Cedex, France
TEL (33) 4-42-53-60-00
FAX (33) 4-42-53-60-01

RF/Automotive
Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
TEL (49) 7131-67-0
FAX (49) 7131-67-2340

Biometrics/Imaging/Hi-Rel MPU/
High Speed Converters/RF Datacom
Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
TEL (33) 4-76-58-30-00
FAX (33) 4-76-58-34-80

e-mail
literature@atmel.com

Web Site
http://www.atmel.com

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