

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

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-06/02



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 $\pm 0.5\%$ 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 1(408) 441-0311
FAX 1(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 1(408) 441-0311
FAX 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 436-4314

La Chantreterie
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 Rousset Cedex, France
TEL (33) 4-42-53-60-00
FAX (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
TEL (44) 1355-803-000
FAX (44) 1355-242-743

RF/Automotive

Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
TEL (49) 71-31-67-0
FAX (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

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>

© Atmel Corporation 2002.

Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

ATMEL® and AVR® are the registered trademarks of Atmel.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.