AVR®530: Migrating from AT90USB162/82 to ATmega16U2/8U2

8-bit AVR® Microcontrollers

Application Note

1 Introduction

In order to optimize the manufacturing process and to further reduce current consumption, an optimized version of AT90USB162/82 has been introduced.

The ATmega16U2/8U2 is a functionally identical, drop-in replacement for the AT90USB162/82. All devices are subject to the same qualification process and same set of production tests but since the manufacturing process is not the same, some electrical characteristics differ. In addition, the performance of some analog modules such as the Brown-Out Detector (BOD) and Power-On Rest (POR) has been improved. Some new features have also been added to the ATmega16U2/8U2.

AT90USB162/82 and ATmega16U2/8U2 have separate datasheets. This application note aims to outline the differences between the two devices and their datasheets, but there is also a detailed change log to assist the user at the end of the ATmega16U2/8U2 datasheet. Remember to always use the latest revision of the device datasheet.

Minor differences in typical characteristics are not discussed in this document as long as the low and high limits remain the same. For detailed information about the typical characteristics, see sections “Electrical Characteristics” and “Typical Characteristics” of the device datasheets.

Note: This application note serves as a guide to ease migration. For complete device details, always refer to the most recent version of the ATmega16U2/8U2 datasheet.

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2 Changes in Characteristics

This section outlines such differences in characteristics that may have an effect on the application in which the device is used. For detailed information, refer to the most recent version of the device datasheets.

2.1 I/O-Ports Input Characteristics

All I/O-Ports Input trigger are now LVTLL compatible for ATmega16U2/8U2 (only MOSI and MISO pins in AT90USB162/82). See VIL/VIH Electrical parameters for standards IOs in ATmega16U2/8U2 datasheet.

2.2 Reset

Table 2-1 summarizes the differences between the reset circuitry of AT90USB162/82 and ATmega16U2/8U2.

Table 2-1. Power-On Reset

Symbol	AT90USB162/82			ATmega16U2/8U2			Unit
	Min	Typ	Max	Min	Typ	Max	
V_{POR}	-	1.2	-	1.1	1.4	1.6	V
V_{POA}	-	1.1	-	0.6	1.3	1.6	V
SR_{ON}	-	-	-	0.01	-	-	V/ms

3 New Bits and Registers

This section summarizes the functional improvement added to the new devices. For more details on the functional enhancements, see ATmega16U2/8U2 datasheet

3.1 Watchdog timer

The watchdog timer has been improved to support more clock timer divider configurations. Table 3-1 lists the register and bits that have been added to the device as a result of functional enhancements. In AT90USB162/82 these bits and register were marked as reserved.

Refer to ATmega16U2/8U2 datasheet for the complete explanation of these bits.

Table 3-1. New Bits for Watchdog timer

Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x62	WDTCKD	-	-	**WDEWIFCM**	**WCLKD2**	WDEWIF	WDEWIE	WCLKD1	WCLKD0

3.2 Analog comparator

Analog comparator has been improved so that the AT90USB162/82 now supports 7 analog inputs. In Table 3-2 are listed registers and bits that have been added to the device as a result of functional enhancements. In AT90USB162/82 these bits and registers were marked as reserved.

Refer to ATmega16U2/8U2 datasheet for the complete explanation of these bits.

Table 3-2. New Bits and Register for Analog Comparator

Addr.	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0x7D	ACMUX	-	-	-	-	-	CMUX2	CMUX1	CMUX0

4 Summary of Changes

For a summary of changes, see the revision history at the end of the ATmega16U2/8U2 datasheet.

Headquarters

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
Tel: 1(408) 441-0311
Fax: 1(408) 487-2600

International

Atmel Asia
Unit 1-5 & 16, 19/F
BEA Tower, Millennium City 5
418 Kwun Tong Road
Kwun Tong, Kowloon
Hong Kong
Tel: (852) 2245-6100
Fax: (852) 2722-1369

Atmel Europe
Le Krebs
8, Rue Jean-Pierre Timbaud
BP 309
78054 Saint-Quentin-en-Yvelines Cedex
France
Tel: (33) 1-30-60-70-00
Fax: (33) 1-30-60-71-11

Atmel 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

Product Contact

Web Site
http://www.atmel.com/

Technical Support
avr@atmel.com

Sales Contact
www.atmel.com/contacts

Literature Request
www.atmel.com/literature