



8-bit **AVR**<sup>®</sup>  
Microcontrollers

## Application Note

# AVR527: Migrating from ATmega164P/324P to ATmega164PA/324PA

## 1 Introduction

In order to optimize the manufacturing process and to further reduce current consumption, an optimized version of ATmega164P/324P has been introduced.

The ATmega164PA/324PA is a functionally identical, drop-in replacement for the ATmega164P/324P. All devices are subject to the same qualification process and same set of production tests, but as the manufacturing process is not the same some electrical characteristics differ.

ATmega164P/324P and ATmega164PA/324PA have separate datasheets. This application note outlines the differences between the two devices and the datasheets. There is also a detailed change log to assist the user at the end of the ATmega164PA/324PA 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 ATmega164PA/324PA datasheet.

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## 2 Changes in Characteristics

This section outlines major 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 Current Consumption

Active and Idle mode current consumption of the device has been reduced significantly. The tables below present typical current consumption figures at room temperature. All values are taken from device datasheets, unless otherwise noted.

**Table 2-1.** Typical Current Consumption of Device at Room Temperature

Mode	Condition	ATmega164P	ATmega164PA	Change
Active	V <sub>CC</sub> =2V, f=1 MHz	0.4 mA	0.3 mA	- 25%
	V <sub>CC</sub> =3V, f=4 MHz	2.1 mA	1.4 mA	- 33%
	V <sub>CC</sub> =5V, f=8 MHz	7.4 mA	4.8 mA	- 35%
Idle	V <sub>CC</sub> =2V, f=1 MHz	0.1 mA	0.07 mA	- 30%
	V <sub>CC</sub> =3V, f=4 MHz	0.5 mA	0.25 mA	- 50%
	V <sub>CC</sub> =5V, f=8 MHz	1.9 mA	1 mA	- 47%

**Table 2-2.** Typical Current Consumption of Device at Room Temperature

Mode	Condition	ATmega324P	ATmega324PA	Change
Active	V <sub>CC</sub> =2V, f=1 MHz	0.42 mA	0.3 mA	- 29%
	V <sub>CC</sub> =3V, f=4 MHz	2.4 mA	1.5 mA	- 38%
	V <sub>CC</sub> =5V, f=8 MHz	8.0 mA	5.2 mA	- 35%
Idle	V <sub>CC</sub> =2V, f=1 MHz	0.13 mA	0.06 mA	- 54%
	V <sub>CC</sub> =3V, f=4 MHz	0.6 mA	0.35 mA	- 42%
	V <sub>CC</sub> =5V, f=8 MHz	2.3 mA	1.3 mA	- 43%

## 3 Datasheet Changes

For a summary of changes, see the datasheet revision history at the end of the ATmega164PA/324PA 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**  
[www.atmel.com/](http://www.atmel.com/)

**Technical Support**  
[avr@atmel.com](mailto:avr@atmel.com)

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