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# AVR520: Migrating from ATtiny13 to ATtiny13A



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

## 1 Introduction

In order to optimize the manufacturing process and to further reduce current consumption, an optimized version of ATtiny13 has been introduced.

The ATtiny13A is a functionally identical, drop-in replacement for the ATtiny13. 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 analogue modules such as the Brown-Out Detector (BOD) and Power-On Reset (POR) has been improved. Some new features have also been added to the ATtiny13A.

ATtiny13 and ATtiny13A have separate data sheets. This application note aims to outline the differences between the two devices and the data sheets, but there is also a detailed change log to assist the user at the end of the ATtiny13A data sheet. Remember to always use the latest revision of the device data sheet.

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 ATtiny13A data sheet.

## Application Note

Rev. 8157B-AVR-12/08



## 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 data sheets.

### 2.1 Current Consumption

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

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

| Mode   | Condition                       | ATtiny13 | ATtiny13A | Change |
|--------|---------------------------------|----------|-----------|--------|
| Active | V <sub>CC</sub> =1.8V, f=1 MHz  | 240 µA   | 190 µA    | - 20%  |
|        | V <sub>CC</sub> =5.5V, f=20 MHz | 13 mA    | 8.8 mA    | - 30%  |
| Idle   | V <sub>CC</sub> =1.8V, f=1 MHz  | 220 µA   | 24 µA     | - 90%  |
|        | V <sub>CC</sub> =5.5V, f=20 MHz | 4.0 mA   | 1.7 mA    | - 60%  |
| Reset  | V <sub>CC</sub> =1.8V, f=1 MHz  | 7 µA     | 5 µA      | - 30%  |
|        | V <sub>CC</sub> =5.5V, f=20 MHz | 2.9 mA   | 1.25 mA   | - 60%  |

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

| Peripheral                    | Condition             | ATtiny13              | ATtiny13A | Change |
|-------------------------------|-----------------------|-----------------------|-----------|--------|
| Analogue Comparator           | V <sub>CC</sub> =1.8V | 60 µA                 | 60 µA     | ± 0%   |
|                               | V <sub>CC</sub> =5.5V | 130 µA                | 80 µA     | - 40%  |
| Analogue-to-Digital Converter | V <sub>CC</sub> =1.8V | 180 µA <sup>(1)</sup> | 170 µA    | - 5%   |
|                               | V <sub>CC</sub> =5.5V | 400 µA <sup>(1)</sup> | 360 µA    | - 10%  |
| Brown-Out Detector            | V <sub>CC</sub> =1.8V | 21 µA                 | 16 µA     | - 25%  |
|                               | V <sub>CC</sub> =5.5V | 28 µA                 | 23 µA     | - 20%  |

Notes: 1. These values were obtained using the same device configuration and test bench as with ATtiny13A. Values in ATtiny13 data sheet were obtained using a different set up.

### 2.2 VOL/VOH Levels

In Table 2-3 are listed differences in output low and high voltage levels.

**Table 2-3.** Changes to VOL and VOH Levels

| Symbol          | Parameter  | Condition                                   | ATtiny13 |     | ATtiny13A |     | Unit |
|-----------------|------------|---------------------------------------------|----------|-----|-----------|-----|------|
|                 |            |                                             | Min      | Max | Min       | Max |      |
| V <sub>OL</sub> | Pins PB0:4 | I <sub>OL</sub> =20mA, V <sub>CC</sub> =5V  | -        | 0.7 | -         | 0.8 | V    |
|                 |            | I <sub>OL</sub> =10mA, V <sub>CC</sub> =3V  | -        | 0.5 | -         | 0.6 | V    |
| V <sub>OH</sub> | Pins PB0:1 | I <sub>OH</sub> =-20mA, V <sub>CC</sub> =5V | 4.2      | -   | 4.0       | -   | V    |
|                 |            | I <sub>OH</sub> =-10mA, V <sub>CC</sub> =3V | 2.5      | -   | 2.3       | -   | V    |

## 2.3 Reset

Table 2-4 summarizes the differences between the reset circuitry of ATtiny13 and that of ATtiny13A.

**Table 2-4.** Power-On Reset

| Symbol           | ATtiny13 |     |     | ATtiny13A |     |     | Unit |
|------------------|----------|-----|-----|-----------|-----|-----|------|
|                  | Min      | Typ | Max | Min       | Typ | Max |      |
| V <sub>POR</sub> | -        | 1.2 | -   | 1.1       | 1.4 | 1.6 | V    |
| V <sub>POA</sub> | -        | 1.1 | -   | 0.6       | 1.3 | 1.6 | V    |
| SR <sub>ON</sub> | -        | -   | -   | 0.01      | -   | -   | V/ms |

## 3 New Bits and Registers

In Table 3-1 are listed registers and bits that have been added to the device as a result of functional enhancements. In ATtiny13 these bits and registers were marked as reserved.

**Table 3-1.** New Bits and Registers

| Addr. | Name  | Bit 7 | Bit 7 | Bit 7 | Bit 7 | Bit 7 | Bit 7 | Bit 7  | Bit 7 |
|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 0x30  | BODCR | -     | -     | -     | -     | -     | -     | BODS   | BODSE |
| 0x25  | PRR   | -     | -     | -     | -     | -     | -     | PRTIM0 | PRADC |

For more details on the functional enhancements, see ATtiny13A data sheet.

## 4 Summary of Changes

For a summary of changes, see the revision history at the end of the ATtiny13A data sheet.



## Headquarters

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

## International

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**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

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**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

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**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

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**Web Site**  
<http://www.atmel.com/>

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

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**Sales Contact**  
[www.atmel.com/contacts](http://www.atmel.com/contacts)

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