
AVR502: Migration between ATmega165(P) and ATmega325(P)

Features

- General Porting Considerations
- Memory
- Clock sources
- IO pins

1 Introduction

This application note summarizes the differences between ATmega165(P) and ATmega325(P). For detailed information on the devices refer to the datasheets.

The ATmega165(P) and ATmega325(P) are designed to be a pin and functionality compatible sub family. Because of the differences in memory sizes and other issues mentioned in this document, there might be a need for some minor modifications in the application when porting code between the devices.



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Application Note

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2 General Porting Considerations

Between the devices described in this application note, some register bits are in different locations within a register. But note that neither registers nor bits have different names, nor are any bits relocated into other registers.

To make the porting process as easy as possible, always refer to registers and bit positions using their defined names. Avoid using absolute addresses and values. In most cases, the register and bit names are unchanged from device to device. When you are porting a design, it is more convenient to include the correct definition file for the new device, rather than manually changing all your addresses and bit values. It is also considered good programming practice to use named references instead of absolute values. Some examples are shown below.

```
PORTE |= (1<<PORTE5);           // Set pin 5 on port E high
DDR  &= ~(1<<PORTE5);           // Set pin 5 on port E as input
// Configure USI
USICR = (1<<USISIE)|(0<<USIOIE)|(1<<USIWM1)|(0<<USIWM0)|
        (1<<USICS1)|(0<<USICS0)|(0<<USICK)|(0<<USITC);
```

To avoid conflicts with added features and register functionality, never access registers that are marked as reserved. Reserved bits should always be written to zero if accessed. This ensures forward compatibility, and added features will stay in their default states when unused.

3 Memory

The sizes of the memories are the main difference between the ATmega165(P) and ATmega325(P). They are all summarized in Table 1. The alternatives of the boot flash section size vary from part to part. All options are summarized in Table 2. When programming the Flash and EEPROM, the memories are accessed in groups by pages. The different page sizes are listed in Table 3. The time to wait for a programming of an EEPROM page is different on ATmega165(P) compared to the two other devices. Typical programming times are listed in Table 4.

Table 1. Memory sizes

	FLASH [bytes]	SRAM [bytes]	EEPROM [bytes]
ATmega165(P)	16384	1024	512
ATmega325(P)	32768	2048	1024

Table 2. Boot flash section sizes

	BOOTSZ: 11 [words]	BOOTSZ: 10 [words]	BOOTSZ: 01 [words]	BOOTSZ: 00 [words]
ATmega165(P)	128	256	512	1024
ATmega325(P)	256	512	1024	2048

Table 3. Programming page sizes

	FLASH page size [words]	EEPROM page size [bytes]
ATmega165(P)	64	4
ATmega325(P)	64	4

Table 4. Wait times when programming EEPROM

	Typical programming time
ATmega165(P)	8.5 ms
ATmega325(P)	3.3 ms

4 Clock sources

The internal RC oscillator in ATmega325(P) is based on a different design than ATmega165(P). The functionality is however similar, but the accuracy is higher on ATmega325(P) than on ATmega165(P). Refer to the datasheets for information on calibration of the oscillators.

5 IO pins

ATmega325(P) has an option to disable the external reset feature. The /RESET pin then becomes an input only IO pin. The reset disable feature is not available on ATmega165(P).



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