AVR 8-bit Microcontrollers

AVR42789: Writing to Flash on the New tinyAVR Platform Using Assembly

APPLICATION NOTE

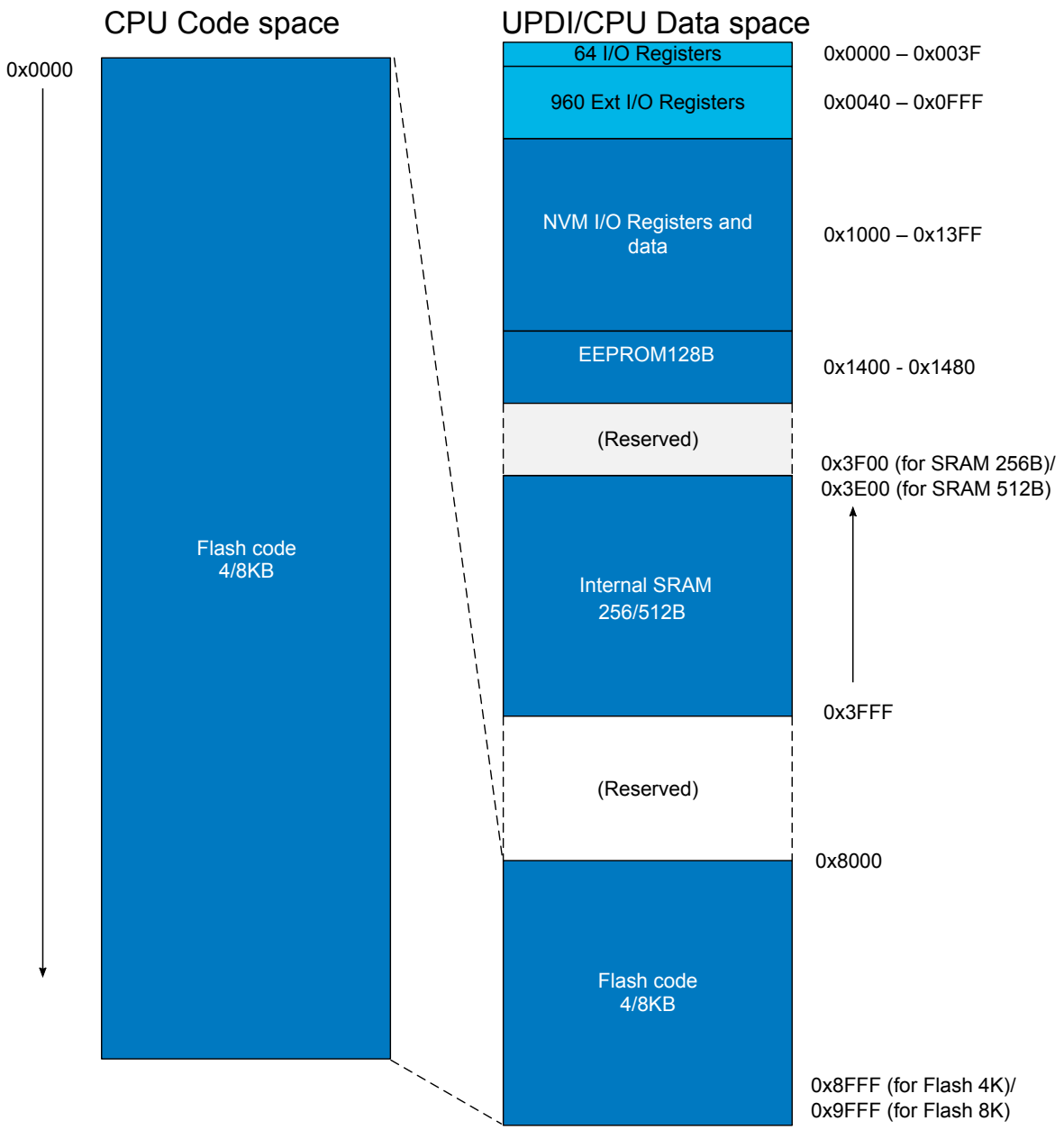
Table of Contents

1. What has Changed....3
   1.1. What This Means and How to Adapt....4
2. Revision History....5

1. What has Changed

On the new family of Atmel® tinyAVR® devices (ATtiny417, ATtiny814, ATtiny816, and ATtiny817) the flash has been included into the CPU data space. This means that it shares the same address space and instructions as SRAM, EEPROM, and I/O registers. This data space is accessible through the use of LD/ST instructions in assembly. Previously, on some of the older Tiny devices flash has been accessible only through the LPM and SPM instructions. In the new tinyAVR devices the LPM instruction still exists, but not the SPM instruction. For the LPM instruction, address 0x0000 is the start of flash, as can be seen in the Memory map figure for LD and ST it is 0x8000.

Figure 1-1. Memory Map of New Devices



In addition to this, writing to flash now has to happen by using the NVM controller where previously this has been done through a combination of the Z-pointer and the SPMCTRL register.

1.1. What This Means and How to Adapt

If existing assembly code that writes to flash is to be ported from older to new tinyAVR devices, the SPM instructions have to be replaced by ST instructions. The ST instruction will not be able to access flash directly, but instead data will be written to the page buffer. This is similar to how it has been done previously, but now handling page erase and page commits are handled by the NVM controller.

Where you would previously store the address to a page in flash in the Z-pointer, this is now handled by an address register in the NVM controller. Note that the address register in the NVM controller is updated automatically when data is written using the ST instruction. Make certain not to write data to a new page before committing the page buffer. If this is done, the data intended to be written to the new page will be with the data already in the page buffer with a bit-wise AND. The same will happen if data is written to the same address twice without committing the page buffer.

Along with the addresses, the commands to erase a page or write the page buffer is now also located in the NVM controller. The commands should now be written to the Control A register in the NVM controller. See the Control A register in the datasheet for a list of the available commands.

These changes will make it necessary to change code written in C or assembly for older tinyAVRs for it to work on the new tinyAVR family (ATtiny417, ATtiny814, ATtiny816, and ATtiny817).

2. Revision History

Doc. Rev.	Date	Comments
42779A	11/2016	Initial document release

Atmel | Enabling Unlimited Possibilities®

Atmel Corporation 1600 Technology Drive, San Jose, CA 95110 USA **T:** (+1)(408) 441.0311 **F:** (+1)(408) 436.4200 | **www.atmel.com**