Recommended Reprogramming Procedure for Atmel's Flash Memories

The AT49X001(N)(T), AT49X002(N)(T), AT49X2048A(T), AT49X4096A(T), AT49X8192A(T) (the X designation could refer to BV, LV, or F) are sectored Flash memory devices. The memory array of each device is divided into multiple sectors, which can be used to store program code or data. The AT49X001(N)(T) and the AT49X002(N)(T) devices are byte-wide memories that consist of two parameter blocks, two main memory blocks, and a boot block. The AT49X2048A(T), AT49X4096A(T), and AT49X8192A(T) are byte or word selectable through the $\overline{\text{BYTE}}$ pin. All three of these memories consist of two parameter blocks, one boot block and one main memory block.

All five of these memories can be reprogrammed by first performing a chip erase and then programming the memory byte by byte or word by word. This is the recommend method of reprogramming the whole device. A sector erase command is also available on all of these devices. The sector erase command only erases a particular region in the memory. After the region is erased, it can be programmed with new data. There are, however, certain restrictions that must be obeyed when using sector erases. The restrictions for the AT49X001(N)(T) and the AT49X002(N)(T) are slightly different than the restrictions for the AT49X2048A(T), AT49X4096A(T), and the AT49X8192A(T). If the restrictions are not adhered to, incorrect data could be stored and later read from the device.

For the AT49X002 (N)(T) and the AT49X001(N)(T), the two main memory sectors are designed such that sector erases of one main memory block must alternate with sector erases of the other main memory block. Repeated attempts to erase and reprogram either Main Memory Block 1 or Main Memory Block 2 may disturb the data in other memory blocks. By alternating updates between Main Memory Blocks 1 and 2, the memory contents will not be disturbed. It is critical that whenever a main memory block is erased and reprogrammed the other main memory block should be erased and reprogrammed prior to any subsequent erase of the first block. Failure to perform the above mentioned procedure could result in incorrect data being read from the device. Each parameter block can be updated independently; erases to the parameter blocks do not need to be alternated with any other erases. Please note that there is no mechanism to erase just the boot block in these devices.

For the AT49X2048A, AT49X4096A, and the AT49X8192A, the parameter blocks are designed such that sector erases of one parameter block must alternate with sector erases of the other parameter block. Repeated attempts to erase and reprogram Parameter Block 1 or Parameter Block 2 may disturb the data in the other parameter block. By alternating updates between Parameter Blocks 1 and 2, the memory contents will not be disturbed. It is critical that whenever a parameter block is erased and reprogrammed the other parameter block should be erased and reprogrammed prior to any subsequent erase of the first parameter block. The main memory region does not need to be reprogrammed even if the parameter

Recommended Reprogramming Procedure for Atmel's Flash Memories

Application Note

Rev. 1913A–05/00

blocks receive multiple updates, however, whenever the main memory block is erased and reprogrammed, the two parameter blocks should be erased and reprogrammed before the main memory is erased again. Similarly, the boot region does not need to be reprogrammed even if the parameter and main memory sectors receive multiple updates, but when the boot block region is erased and reprogrammed, the main memory and the parameter blocks should be erased and reprogrammed before the boot block is erased again. Failure to perform the above mentioned procedure could result in incorrect data being read from the device.

Note that the possible disturb effect only occurs during an erase operation not a programming operation (due to the shortness of the programming cycle). Please contact Atmel regarding any questions on the erasing or programming of any one of these five devices.

Atmel Headquarters

Corporate Headquarters
2325 Orchard Parkway
San Jose, CA 95131
TEL (408) 441-0311
FAX (408) 487-2600

Europe
Atmel U.K., Ltd.
Coliseum Business Centre
Riverside Way
Camberley, Surrey GU15 3YL
England
TEL (44) 1276-686-677
FAX (44) 1276-686-697

Asia
Atmel Asia, Ltd.
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimhatsui
East Kowloon
Hong Kong
TEL (852) 2721-9778
FAX (852) 2722-1369

Japan
Atmel Japan K.K.
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL (81) 3-3523-3551
FAX (81) 3-3523-7581

Atmel Operations

Atmel Colorado Springs
1150 E. Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL (719) 576-3300
FAX (719) 540-1759

Atmel Rousset
Zone Industrielle
13106 Rousset Cedex
France
TEL (33) 4-4253-6000
FAX (33) 4-4253-6001

Fax-on-Demand
North America:
1-(800) 292-8635
International:
1-(408) 441-0732

e-mail
literature@atmel.com

Web Site
http://www.atmel.com

BBS
1-(408) 436-4309

1913A–05/00/xM