

CLAIMS

1. A method of operating a ferroelectric memory cell, comprising:
applying a positive voltage to a ferroelectric capacitor of the ferroelectric memory cell, wherein the ferroelectric capacitor is in electronic communication with a digit line;
determining that a rate of change of a voltage of the digit line has reached a threshold in response to the positive voltage being applied; and
applying a negative voltage to the ferroelectric capacitor after the voltage of the digit line reaches the threshold.
2. The method of claim 1, further comprising:
comparing the voltage of the digit line to a ground reference after the negative voltage is applied.
3. The method of claim 2, further comprising:
determining a logic value of the ferroelectric memory cell based at least in part on the comparison of the voltage of the digit line to the ground reference.
4. The method of claim 1, wherein a magnitude of the negative voltage applied to the ferroelectric capacitor is based at least in part on the threshold.
5. The method of claim 1, further comprising:
determining that the voltage of the digit line has reached a second threshold based at least in part on determining that the positive voltage has been applied for a predetermined duration.

6. The method of claim 5, wherein the predetermined duration is based at least in part on at least one of:

a characteristic of the ferroelectric capacitor, a characteristic of the digit line, a timing associated with reading or writing to the ferroelectric memory cell, or any combination thereof.

7. Presented) The method of claim 1, further comprising:
determining that the voltage of the digit line has reached a second threshold based at least in part on determining that the voltage of the digit line has reached a threshold voltage.

8. The method of claim 1, wherein applying the positive voltage to the ferroelectric capacitor comprises:
virtually grounding the digit line;
applying the positive voltage to a plate line in electronic communication with the ferroelectric capacitor; and
applying a second voltage to a word line in electronic communication with the ferroelectric capacitor.

9. The method of claim 1, wherein applying the negative voltage to the ferroelectric capacitor comprises:
applying the negative voltage to a plate line in electronic communication with the ferroelectric capacitor.

10. The method of claim 1, wherein determining that the rate of change of the voltage of the digit line comprises determining that the rate of change is less than 10 mV/ns.

11. The method of claim 1, wherein determining that the rate of change of the voltage of the digit line comprises determining that the voltage of the digit line is within a percent range of an expected settling voltage.

12. An electronic memory apparatus, comprising:
a ferroelectric memory cell that comprises a ferroelectric capacitor in electronic communication with a digit line; and
a controller in electronic communication with the ferroelectric memory cell and operable to:
connect a positive voltage source to the ferroelectric capacitor;
determine that a rate of change of a voltage of the digit line has reached a threshold; and
connect a negative voltage source to the ferroelectric capacitor after the voltage of the digit line reaches the threshold.

13. The electronic memory apparatus of claim 12, wherein the controller is operable to:
compare the voltage of the digit line to a ground reference after a negative voltage is applied to the ferroelectric capacitor.

14. The electronic memory apparatus of claim 13, wherein the controller is operable to:
determine a logic value of the ferroelectric memory cell based at least in part on a comparison of the voltage of the digit line to the ground reference.

15. The electronic memory apparatus of claim 12, wherein the controller is operable to:
determine that a voltage of the digit line has reached a second threshold in response to a positive voltage applied to the ferroelectric capacitor.

16. The electronic memory apparatus of claim 15, wherein the controller is operable to:

determine that a voltage of the positive voltage source has been applied to the ferroelectric capacitor for a predetermined duration; and

determine that the voltage of the digit line has reached the second threshold based at least in part on determining that the voltage of the positive voltage source has been applied for the predetermined duration.

17. The electronic memory apparatus of claim 16, wherein the predetermined duration is based at least in part on at least one of:

a characteristic of the ferroelectric capacitor, a characteristic of the digit line, a timing associated with reading or writing to the ferroelectric memory cell, or any combination thereof.

18. The electronic memory apparatus of claim 12, further comprising:
a plate line in electronic communication with the ferroelectric capacitor,
wherein the controller is operable to:

applying a positive voltage to the plate line by connecting the positive voltage source to the ferroelectric capacitor.

19. The electronic memory apparatus of claim 12, further comprising:
a plate line in electronic communication with the ferroelectric capacitor,
wherein the controller is operable to:

applying a negative voltage to the plate line by connecting the negative voltage source to the ferroelectric capacitor.

20. The electronic memory apparatus of claim 12, wherein a voltage of the negative voltage source is based at least in part on the threshold.