

Why does Flash mass erase time differ from one MCU to another?

**Questions:**

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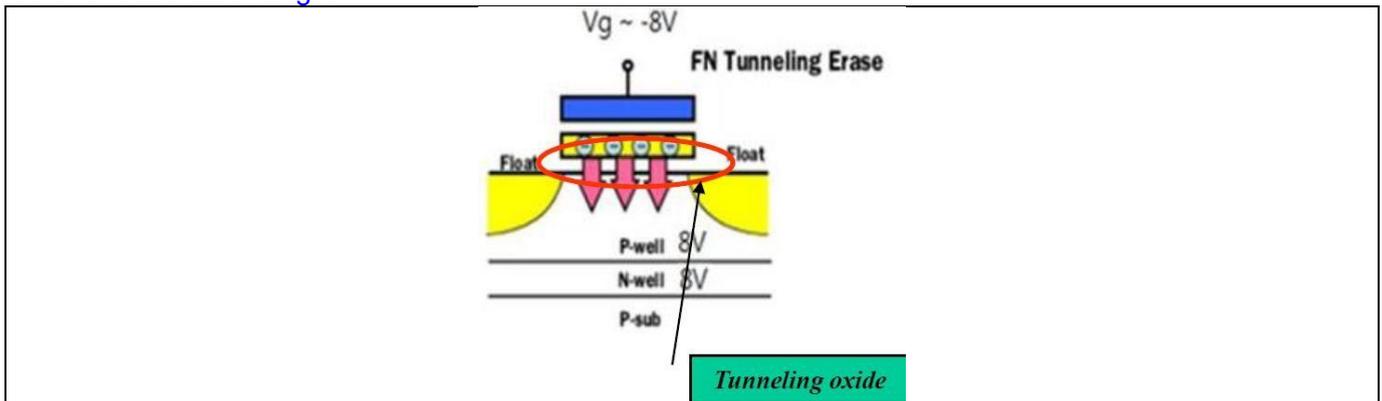
**Answer:**

Mass erase time is affected by the following factors:

- (1) Tunneling oxide thickness, the thicker it is, the longer the mass erase takes;
- (2) Internal electric field intensity, the weaker it is, the longer the mass erase takes;

Both factors are related to manufacturing process.

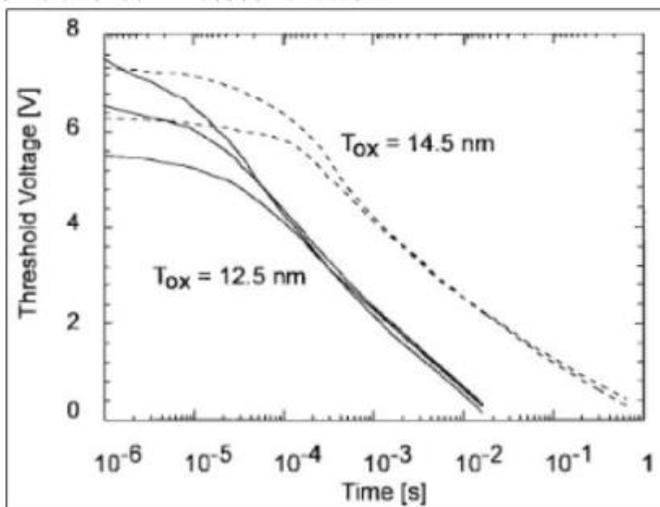
Based on the figure below, these two factors are not in proportion to mass erase time. Instead, they have exponential relationship with mass erase time. Therefore, it is still acceptable even if there are several-fold differences among MCUs in terms of mass erase time, which means that their manufacturing process are within a reasonable range.



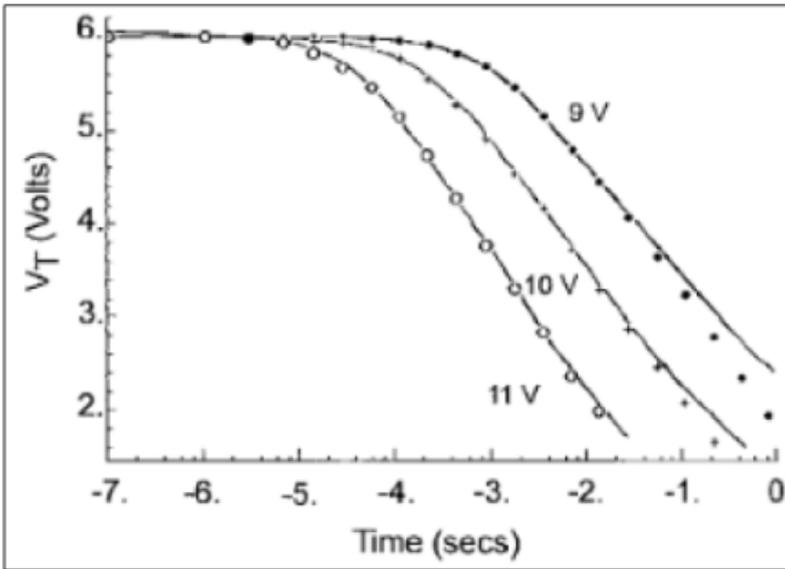
Erase field=12 V

Tox: tunneling oxide thickness

The figure below shows the impact of Tox on the erase time.



Erase curve of a cell with  $T_{ox} = 12\text{nm}$  with different erase field applied  
 Under the same  $T_{ox}$ , the electric field intensity affects the erase time



**Type:** MCU

**Applicable products:** AT32F403, AT32F403A, AT32F407, AT32F413, AT32F435, AT32F437

**Main function:** Flash

**Minor function:** None

**Document revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
2022.2.23	2.0.0	Initial release

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