SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PIC16F877-Flash/EEPROM

Dr.G.Arthy
Assistant Professor
Department of EEE
SNS College of Engineering

MEMORIES

Memory	Size	Description
FLASH	8k-bytes	Used to store the programs
RAM	368-bytes	Temporary/ScratchPad memory used during program execution.
EEPROM	256-bytes	Used to store the non-volatile data across power cycles

What is EEPROM?

- Electrically erasable programmable read-only memory is known by the EEPROM.

- EEPROM is a non-volatile memory which is used in the computers and other electronic to store small quantities of data that must be saved when the power is turned off.

- EEPROM has the benefit of being able to be wiped and reprogrammed without the use of a special tool or Erase cycle.

DRAWBACK OF EEPROM

- The fact that EEPROM only has a finite amount of erase/write cycles—typically about 100,000—is a drawback.

- After this time, the cell will no longer be able to reliably keep a charge, and data will begin to degrade.

What is Flash Memory?

- Flash memory is extensively used as the top form of storing in numerous devices, including solid- state drives, USB flash drives, and digital cameras.

- Flash, also known as flash memory, is a way of jotting and storing data that makes use of flash memory chips.

EEPROM vs Flash Memory

- Flash is just one type of EEPROM.
- Flash uses NAND-type memory, while EEPROM uses NOR type.
- Flash is block-wise erasable, while EEPROM is byte-wise erasable.
- Flash is constantly rewritten, while other EEPROMs are seldom rewritten.
- Flash is used when large amounts are needed, while EEPROM is used when only small amounts are needed.
- Flash is less endurance than EEPROM.
- Flash's life cycle is more as compared to EEPROM.
- Flash is cheaper than EEPROM.
- Flash uses a parallel interface while EEPROM uses I2C and SPI Interface.
- Flash is erased block-wise and EEPROM is erased byte-wise.

Differences between EEPROM and Flash Memory

- **Write and Erase Process:** EEPROM allows individual byte-level writes and erases, while Flash memory requires block-level erasing before writing.

- **Speed:** EEPROM is faster in write and erase operations at the byte level, whereas Flash memory has higher capacity but is slower due to block-level erasing.

- **Endurance:** Flash memory offers better endurance due to wear-leveling algorithms, making it suitable for applications with frequent updates.

- **Density:** Flash memory can achieve higher storage density compared to EEPROM, making it more cost-effective for larger storage capacities.

- **Applications:** EEPROM is used for applications where occasional updates are required, while Flash memory is used in devices with frequent data updates and higher storage needs.

FLASH Vs EEPROM

Flash memory	EEPROM
Based on NAND gates	Based on NOR gates
Memory density is more compared to EEPROM	Memory density is less compared to flash memory
Access to this memory is slower as the architecture is based on NAND	Access to this memory is faster as the architecture is based on NOR
Supports Erase, Write, Read operations	Supports Erase, Write, Read operations
Flash is erased block-wise	EEPROM is erased byte-wise
Write cycles are faster than EEPROM Read cycles are slower than EEPROM Erase cycles are faster than EEPROM	Write cycles are slower than flash Read cycles are faster than flash Erase cycles are slower than flash
Memory access in sequential. So, read is slower	Memory access in random. So, read is faster
Cheaper	Costly
Mainly used for program storage and data storage	Mainly used in applications to store configuration data.
Less endurance than EEPROM	More endurance than flash memory
Maximum erase/write cycles are less than EEPROM	Maximum erase/write cycles are more than flash
Size of this range up to GB	Size of this range from KB to MB.
USB thumb drives, hard disk and other mass storage media use flash memory	Examples of this memory usage include configuration storage in embedded boards`
Life cycle is more than EEPROM	Life cycle is lesser than flash
Parallel (D0-D7 along with control lines and address lines) interface for the microcontroller/processor	I2C, SPI interface for the microcontroller/processor
Example: S34ML16G202TFI200 from Cypress	Example: AT24C512C from ATMEL

Assessment

1. In which memory Write and Erase Process takes place in block-level?

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2. Which memory uses serial interface?

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