

PROM, EPROM, and EEPROM

PROM, EPROM, and EEPROM are types of Read-Only Memory (ROM) that store data non-volatilely, differing in how they're programmed and erased: PROM is Programmable Read-Only Memory, written once; EPROM (Erasable Programmable ROM) uses UV light for erasure; and EEPROM (Electrically Erasable Programmable ROM) uses electrical signals for byte-level erasing and rewriting, making it the most flexible and commonly used in modern devices.

PROM (Programmable Read-Only Memory)

- **Programming:** Can be programmed by the user only *once* after manufacturing, making it a "write-once, read-many" (WORM) memory.
- **Erasure:** Irreversible; data cannot be changed once written.
- **Use:** For permanent, fixed data like boot instructions (BIOS/UEFI) in older systems.

EPROM (Erasable Programmable Read-Only Memory)

- **Programming:** Can be written to multiple times.
- **Erasure:** Requires removal from the device and exposure to strong Ultraviolet (UV) light for several minutes to erase the entire chip.
- **Feature:** Often has a quartz window on the chip for UV exposure.

EEPROM (Electrically Erasable Programmable Read-Only Memory)

- **Programming:** Can be programmed and erased electrically.
- **Erasure:** Allows for byte-by-byte erasure and reprogramming without removing the chip, using electrical signals.
- **Advantage:** More flexible than EPROM, as it doesn't need special UV light or removal.
- **Modern Relevance:** The basis for modern Flash Memory (a faster, higher-density EEPROM type) used in USB drives, SSDs, and memory cards.

Read-only memory (ROM) is a type of memory that permanently stores data, even when a device is turned off. ROM is used in devices like computers, phones, and appliances to store

important instructions, like those needed to start up the device. In this article, we will discuss different types of ROMs along with their advantages and disadvantages.

What is ROM?

ROM is a non-volatile storage media used in computer systems and other electronic devices. Its main purpose is to store data that can only be read and not changed, making it easier for different hardware components to communicate with one another. There are different types of ROM, some ROM allow data to be written only once, while others can be rewritten in special ways.

Different Types of ROM

There are four types of ROM, which are mentioned below:

- Electrically Erasable Programmable Read-Only Memory(EEPROM)
- Mask ROM
- Erasable Programmable Read-Only Memory(EPROM)
- Programmable Read-Only Memory(PROM)

1. Electrically Erasable Programmable Read-Only Memory(EEPROM)

Electrically Erasable Programmable Read-Only Memory (EEPROM) is a type of non-volatile memory that allows data to be **erased and reprogrammed electrically**. Data in EEPROM can be erased and rewritten without removing the chip from the device and without the need for special light sources.

Advantages of EEPROM

- EEPROM does not need to be removed from the device to write new data or erase existing data.
- Data may be erased and rewritten indefinitely using EEPROM technology.
- Electric current is used to upload and erase EEPROM data.
- It is possible to erase data from the EEPROM chip byte.

Disadvantages of EEPROM

- In EEPROM, Different voltages are needed for operations, including recording and erasing data from memory chips.
- Compared to other ROM chips, EEPROM is more costly.
- EEPROM often has a finite capacity, and updating it might be costly or challenging.
- Data stored on EEPROMs has a finite lifespan.

2. Mask ROM

Mask ROM is a type of read-only memory(ROM) whose capacity is programmed by the integrated circuit manufacturer. The memory is furnished by the customer to the device manufacturer. Mask ROM is not able to allow the user to alter the data contained therein, much like other forms of ROM.

Advantages of Mask ROM

- The cost of mask ROM is its primary benefit. Compared to all other semiconductor memory types, mask ROM was the most compact kind per bit.
- The user may program it. The information and instructions therein are unchangeable once coded.

Disadvantages of Mask ROM

- MASK ROM has to be replaced frequently and has a very limited lifespan.
- If the stored data has to be altered, it cannot be reprogrammed.
- Changing the stored data when system needs change is quite costly.
- Mask ROM is valuable correlated to other ROM chips.

3. Erasable Programmable Read-Only Memory(EPROM)

EPROM is reorganized. Whereas PROM is more expensive, EPROM is non-volatile. Erasable Programmable Read-Only Memory is for erasing and rewriting the programming. EPROM is more economical than PROM. Reprogrammed of it is limited. Before the era of EEPROM and flash memory, EPROM was used in microcontrollers.

Advantages of Erasable Programmable Read-Only Memory

- In Erasable Programmable Read-Only Memory, programme be erased and rewritten.
- The nature of EPROM is non-volatile.
- EPROM is more economical than PROM.
- It Delete all of the prior data in order to reprogram it.

Disadvantages of Erasable Programmable Read-Only Memory

- EPROM cannot erase a single byte on its own. if you delete a single byte, all of EPROM's bytes are also destroyed.
- Data deletion from the EPROM Memory Chip requires extra time.
- Changing the stored data when system needs change is quite costly.
- Users can not add information frequently and guidelines based on what they need.

4. Programmable Read-Only Memory (PROM)

PROM has the ability to program it. Data and instructions cannot be altered after they have been programmed. Hardwiring the ROM chip is not necessary for programming. The data

stored in it are permanently stored and can not be changed or erasable. It is used in low-level programs such as firmware or microcode.

Advantages of Programmable Read-Only Memory

- Due to the simplicity of its circuitry, this memory is more dependable.
- Today's market is filled with a wide variety of programming software.
- Hardwiring the ROM chip is not necessary for programming.
- Data may be erased and rewritten indefinitely using Programmable read-only memory.

Disadvantages of Programmable Read-Only Memory

- Data of Programmable read-only memory can not be modified.
- Programmable read-only memory often has a finite capacity, and updating it might be costly or challenging.
- Users can not add information frequently and guidelines based on what they need.
- The programmer can burn undesired fuses by selecting a specific path for the current by applying a high voltage.

