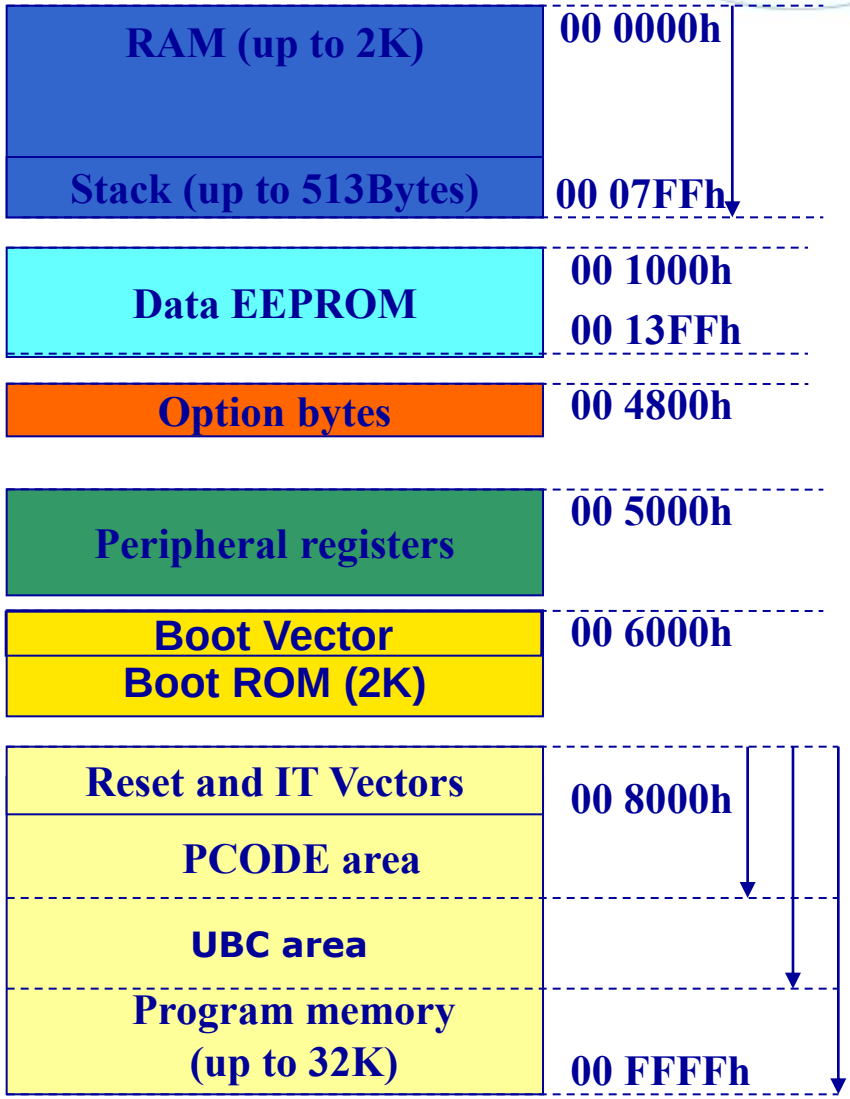
Flash and Data EEPROM

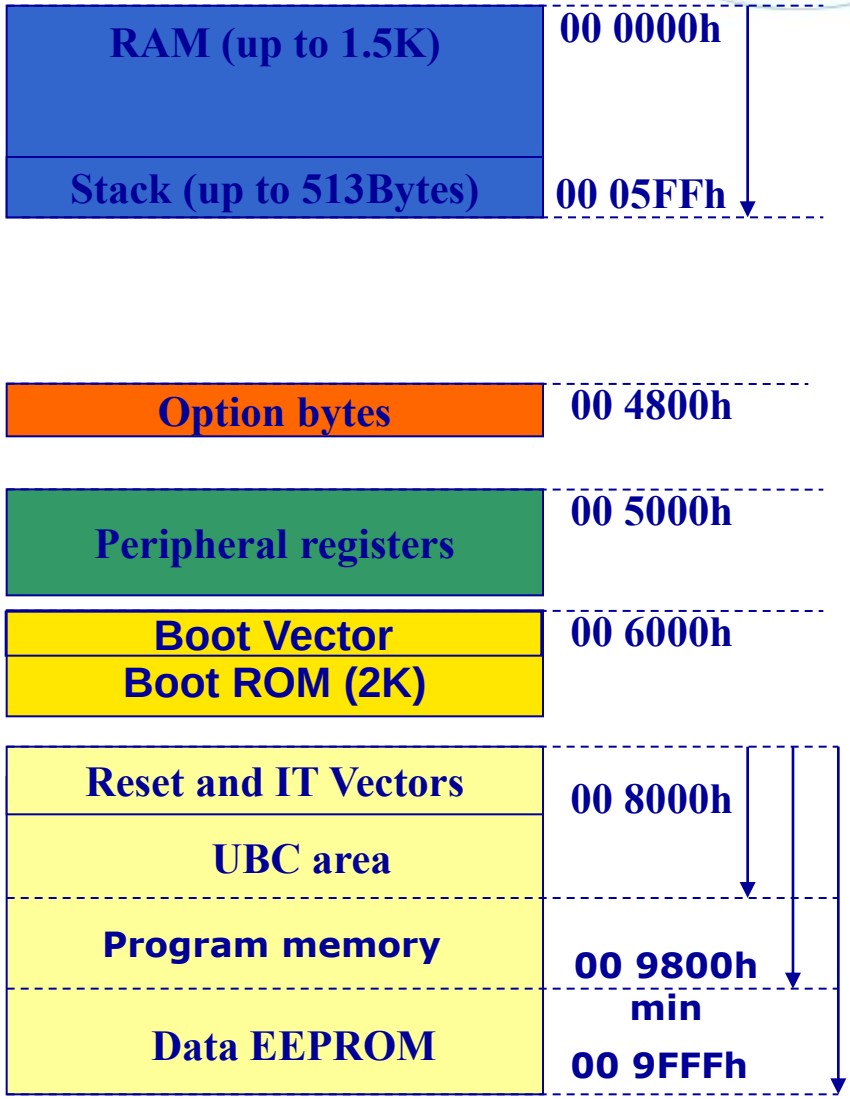
Memory mapping and main features L15x

- Up to 32kbyte Program memory (flash) based on EEPROM technology and up to 1k Data EEPROM memory
- Write protection with Memory Access Security System (MASS keys)
- Programmable write protected User Boot Code area (UBC)
- Automatic read-out protection of Proprietary code area (PCODE)
- Boot ROM embedding ST proprietary boot loader code
- One Interrupt vector dedicated to end of program/erase operation and on illegal program operation



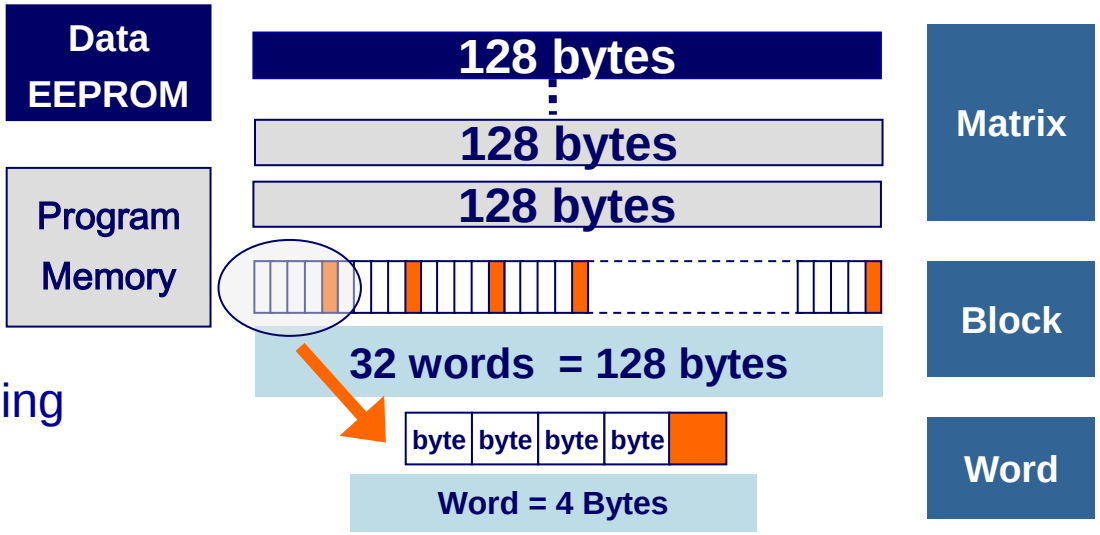
Memory mapping and main features L101

- Up to 8kbyte Program memory (flash) based on EEPROM technology
- Part of memory can be configured by option byte as Data EEPROM memory up to 2 kB
- Write protection with Memory Access Security System (MASS keys)
- Programmable write protected User Boot Code area (UBC)
- One Interrupt vector dedicated to end of program/erase operation and on illegal program operation



Memory mapping and main features (2/2)

- Read While Write capability (L15x)
- Read Out Protection (ROP)
- Byte, word or block programming capabilities
- 6ms programming time (3ms erase + 3ms write)



- In Circuit Programming (ICP) and In Application Programming (IAP) capabilities
- Memory state configurable to operating or power-down mode (IDDQ) in the device low power modes (L15x)

Flash Operations (1/2)

- Byte programming is done with a simple load instruction at the target address.
- Word programming allows the user to program 4 bytes with only one programming cycle which minimizes the programming time. The initial address must be the first word address.
- Block programming allows the user to program of 128 bytes in one programming cycle, the gain of time is very significant.
  - Standard block programming: the block is first erased then programmed.
  - Fast block programming: the block is not erased before programming. This mode has to be used only when the block is blank before operation, else the content is not guaranteed.
  - Block erase: The full block is erased. In this case it is enough to write ‘0’ in the first word of the block (4 bytes).

Don’t forget to unprotect the memory with MASS keys

Flash Operations (2/2)

- Attention! The data loading operation for block writing has to be performed from the RAM even when addressing the Data EEPROM.
- In case of Data EEPROM programming the soft can return into Program memory as soon as dedicated flag HVOFF gives the green light when programming HV starts and thus to perform other tasks. It means that the RWW capability is available during the actual programming phase after the data loading.
- In order to prevent any unwanted write access to the Program memory, to the Data EEPROM and to the Option bytes, the whole NVM memory is Write protected by default after a device reset.

Don’t forget to unprotect the memory with MASS keys

Memory dedicated option bytes

- There are three option bytes dedicated to memory protection: the Read-out protection (ROP), the Proprietary code protection (PCODE L15x only) and the UBC protection
- When the ROP is set, it is impossible to read back the memory
  - Only embedded code can read the Program and Data memories
  - ICP/SWIM will not allow to read the memory, only the option byte can be read
  - Programming tools cannot read the memory
- When the UBC protection is active (protecting critical application routine from unwanted modifications), the protected area always include the reset and interrupts vectors.
- When the PCODE is active (to protect proprietary software libraries used to drive peripherals), the protected area always NOT include the reset and interrupts vectors (L15x)

Low power mode of 15x devices

- The Flash program memory and data EEPROM have one low power consumption mode: IDDQ, In this mode, the memory is switched off
- When the device is in Wait mode program and data memory can be configured in IDDQ mode by setting WAITM bit
- When the device is in Run, Low power run or Low power wait mode program and data memory can be configured in IDDQ mode by setting EPPM bit
- When the program and data memory exit from IDDQ mode, the recovery time is lower than 2.8 µs depends on supply voltage and temperature

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