

ASCII Code Format for Letters

Letters in ASCII are represented with the format: 01XXXXXX.

The first two bits (01) are fixed for all letters.

The 3rd most significant bit (MSB) determines if the character is uppercase or lowercase:

- If it's 0, the character is uppercase.
- If it's 1, the character is lowercase.

The 5 least significant bits (LSB) encode the letter itself. With 5 bits, you can represent up to ($2^5 = 32$) values:

- The first 26 values [1–26] correspond to the letters of the alphabet (A–Z).
- The remaining 6 values [27–32] are reserved for special characters.

Additional Notes:

The lowercase version of a letter is offset by 32 from its uppercase version.

For example:

- Uppercase 'M': 01001100
- Lowercase 'm': 01101101

Bitwise Operations for Changing Case:

Using bitwise operations with specific masks, you can convert letters between uppercase and lowercase, or even toggle their casing:

1. To convert to lowercase, use the OR operation with the mask 00100000:

- Example:

'A' (01000001) OR 00100000 = 'a' (01100001)

2. To convert to uppercase, use the AND operation with the mask 11011111:

- Example:

'a' (01100001) AND 11011111 = 'A' (01000001)

3. To toggle the case, use the XOR operation with the mask 00100000:

- Example:

'A' (01000001) XOR 00100000 = 'a' (01100001)

'a' (01100001) XOR 00100000 = 'A' (01000001)

0	1	UPPER=0 LOWER=1	Letter range: (A-Z) (1-26) (00001-1101)				
0	1	X	X	X	X	X	X