BIOS, CMOS and UEFI

BIOS

-stands for **B**asic **I**nput **O**utput **S**ystem

-is firmware built into a chip located on the motherboard

-firmware is another word for software that is often a permanent part of a cip or device

-this software is responsible for detecting and setting up all the devices connected to the computer

-its next step is to go into a memory device ie hard drive or usb to find and load an OS or other software i.e clonezilla, gparted etc. into RAM

POST

as part of its role it performs a **POST** (power on self test)

-during this test it detects errors with any device and if there is one it will emit beeps as an indication of what the problem is

-a single beep means things are good

-no beeps or multiple beeps means there’s a problem

-check the manufacturer’s documentation to find the list of beep codes

BIOS Chip

-located on the motherboard

-is **non-volatile**-retains info after power is off

-refers to settings i.e. boot sequence found in the **CMOS** chip

-CMOS is **volatile**

-loses info with no power

-use a battery to save the settings while the computer is off

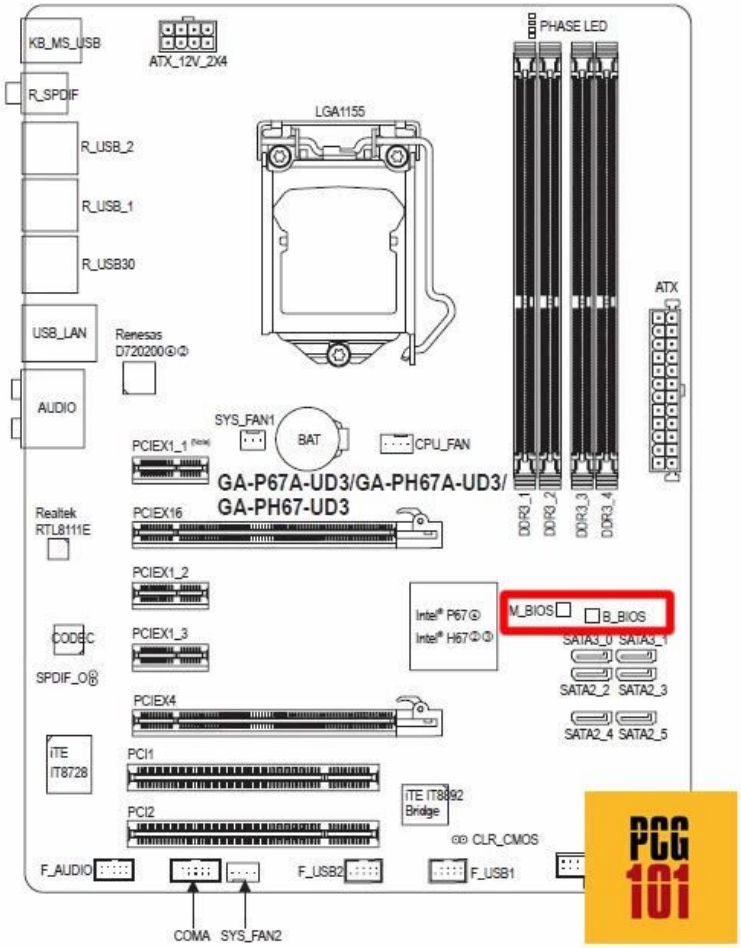
-removing the battery clears the CMOS stored settings

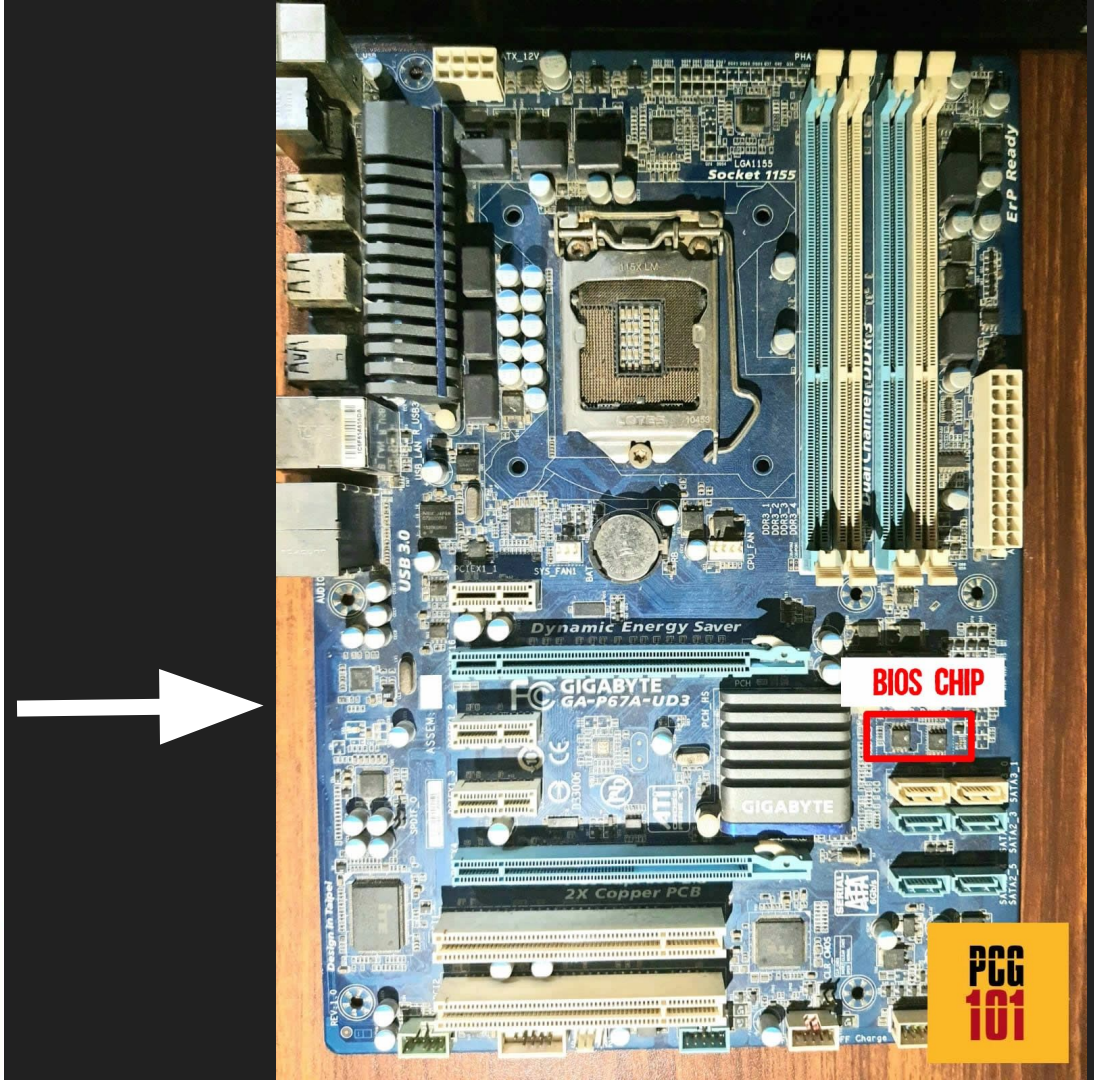
How to Identify the BIOS Chip

2 methods

1. Use the motherboard manuals motherboard layout diagram
2. Physical Inspection

GA-P67A-UD3/GA-PH67A-UD3/GA-PH67-UD3
Motherboard Layout



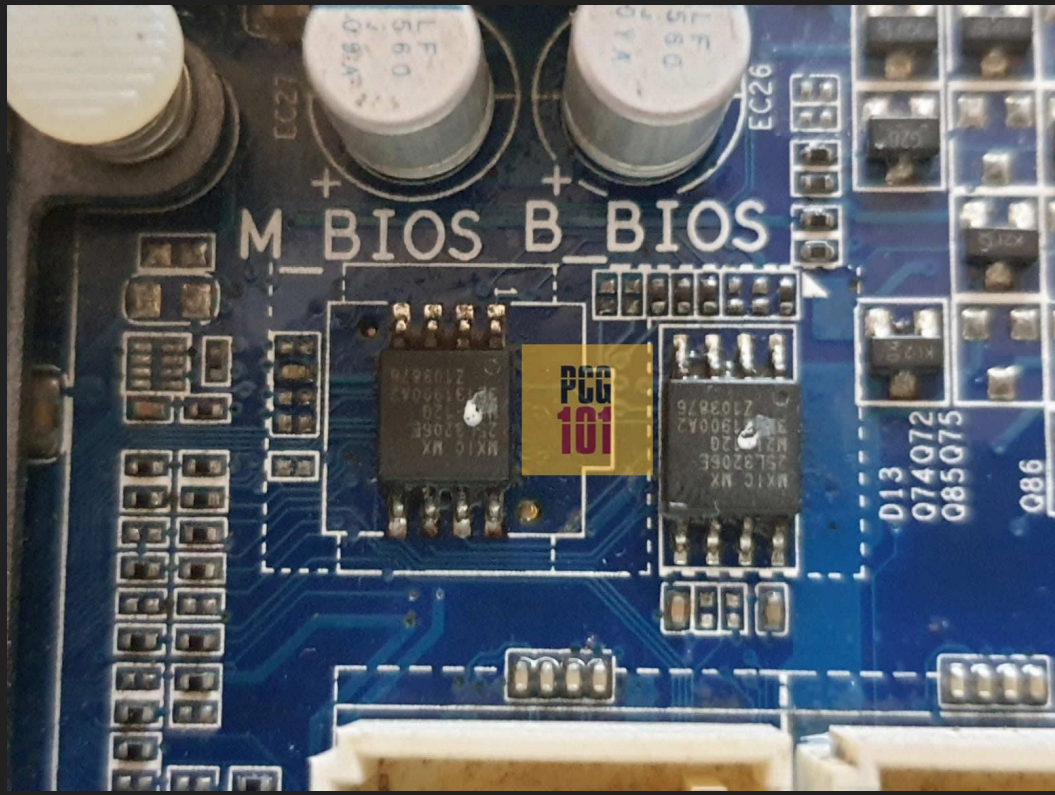


Physical Inspection

-the chips usually have labels like M_BIOS, B_BIOS, UEFI etc.

-oten there are two chips: a primary one (M_BIOS) and a backup one (B_BIOS)

-on some newer motherboards the CMOS chip is part of the PCH platform controller hub)



UEFI

-**unified extensible firmware interface**

-new BIOS

-advantageous over the old BIOS

-supports a GUI and use of a keyboard and mouse

-supports larger HDDs

-has built in features called **Secure Boot** which prevents loading of tampered OS or other files

Questions and Exercises

1. What does CMOS stand for?

Complementary Metal-Oxide-Semiconductor

2. Explain the difference in terms of memory with regards to the BIOS and the CMOS.

BIOS = non-volatile; CMOS = volatile

3. Why does the CMOS need a battery?

Volatile memory; data is lost when power is off

4. How do you access the BIOS in most computers?

By pressing an F key i.e. F2, during bootup

5. How can you tell that your computer is using UEFI over BIOS?

Through firmware settings (F2 during bootup), go to Secure Boot and check for Legacy (BIOS) or UEFI

6. Look over the image on the next page and circle the BIOS chip(s) and the CMOS battery. You can view the image here 108b.jpg (828×768) (techpowerup.com) and use zoom to look at it closer
7. Look at the manual E14093_ROG_STRIX_X470-F_GAMING_UM_V2_WEB.pdf (asus.com). Explain what one continuous beep followed by three short beeps means?

No VGA Detected

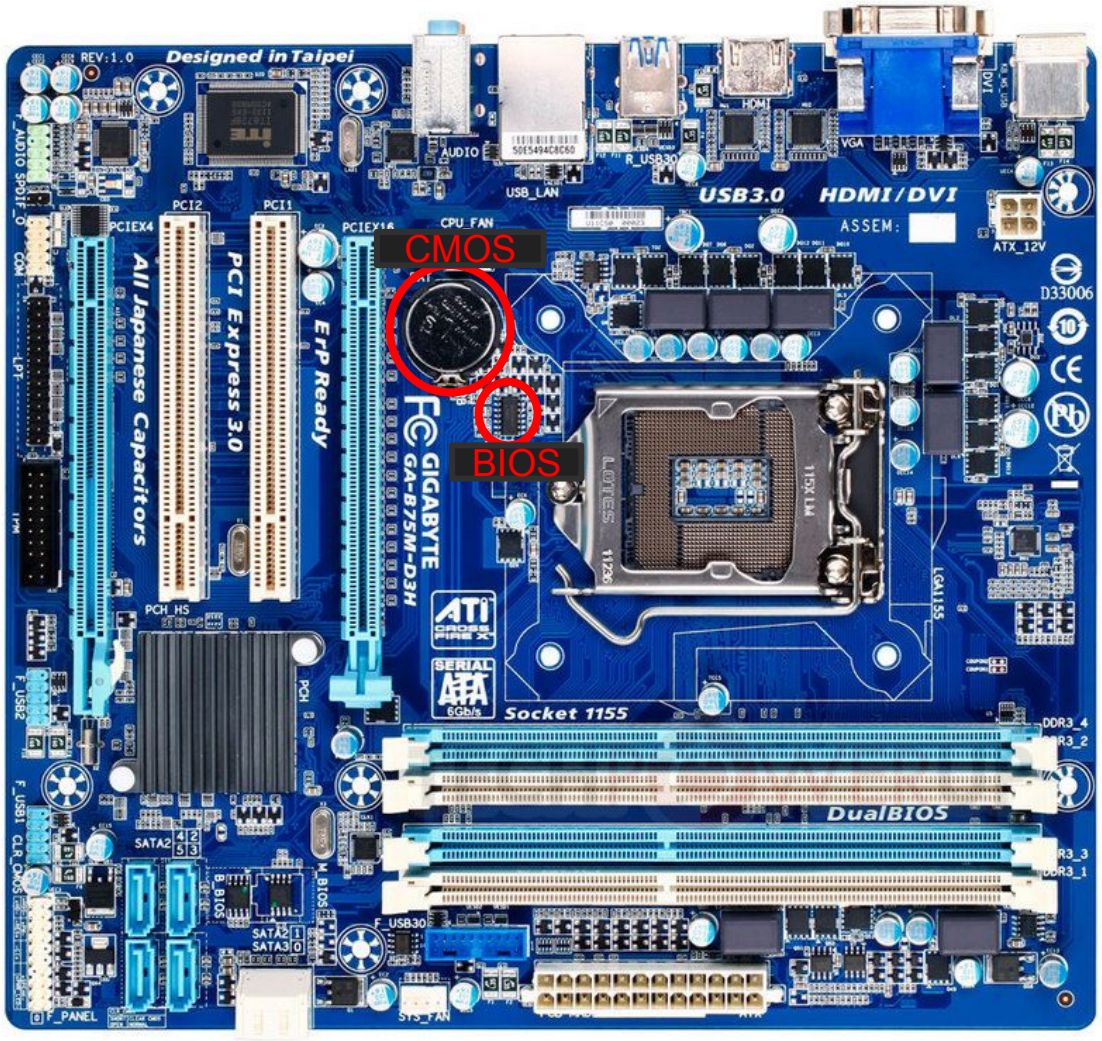
8. Include a link to a motherboard manual and list the page numbers where you can find the motherboard layout diagram as well as the information on the bios beep representations.

(Motherboard layout diagram) 1-2 (Bios Beeps) 2-17

9. Access your computer and its BIOS. Determine if its using the old BIOS or the newer UEFI. Using either of these, reset the BIOS/UEFI settings and restart your computer. Access the BIOS/UEFI again and reset the boot sequence so that the computer will boot from a USB first, CD ROM second and HDD last. Test that this works by burning a bootable image (gparted) to a USB using Balena Etcher or Rufus.

Balena Etcher can be downloaded here:
https://drive.google.com/file/d/1Dir20-p4eZE7dcCZpwH_6m-7kvjnGpXS/view?usp=sharing

gparted iso-https://drive.google.com/file/d/1zV1n6Rto1xAv2HV4EMbESv4hRfXNOzYA/view?usp=sharing


CMOS
BIOS
Designed in Taipei
REV:1.0
USB3.0
HDMI/DVI
All Japanese Capacitors
PCI Express 3.0
ErP Ready
GIGABYTE
GA-B75M-D3H
Socket 1155
DualBIOS
PCIEX4
PCI2
PCI1
PCIEX16
CPU_FAN
PCH_HS
SATA2
SATA3
F_PANEL
F_USB30
F_USB2
F_USB1
CLR_CMOS
B_BIOS
M_BIOS
SYS_FAN
ATX_12V
D33006
DDR3_4
DDR3_2
DDR3_3
DDR3_1
AUDIO
USB_LAN
HDMI
DVI
VGA
ASSEM: