FLASH

First Learning And Support Handbook

HARDWARE MODULE

*This Document must be used only as a Reference material during your Training period.

Who are We?

HP INC

About HP CCCB

Customer Care Center Bangalore

Divisions in CCCB

Personal systems (PS)/Personal Computer (PC)

I work for PS L1 Support what do we Support?

Desktop and Laptops/Notebooks

HP INC (Pcs and Printers)

REGIONS that we support from CCCB

GA = Greater Asia = Australia/ New Zealand = (02:00 A.M)

SEA = Singapore/Malaysia = (05:30 A.M)

INDIA = (09:00 A.M)

EMEA = East Middle East Asia = UK = (03:00 P.M)

US/Canada = (06:00 P.M)

PC Business

Commercial

Offices/Organizations/Companies/Governments etc.

Consumer

Personal usage

PS INDIA Teams

L0 Team = CDT (Call Director Teams)

PS Technical L1 Voice Support

SMB = Small Medium Business support

NA = Named Account

ADX = Account Dynamics

Prime

Partner/CE Assist

CT = Commodity Tracking team

POP = Proof of Purchase

DOA = Defective on Arrival

EMT = Escalation Management Team

CRT = Customer Relationship Team

Premium = Omen by HP, Spectre, HP Slice, ENVY

DSO = Desktop Support Organization = Thin clients, Workstations, RPOS (Retail Point of Sales)

Dispatch /DVT = Dispatch validation Team

2LS =2nd Level Support

3LS = 3rd Level Support

Pro-Active Management Team /DAAS = Device as a Service

Support Teams

Mentor/Trainers/Quality analysts/RTAA (Real Time Adherence Analyst)

Service Level

sNPS = Support Net Promoter Score

10

9 or 10 = Promoter,8,7 = Passive, below that = Detractor.

sNPS = Support Net Promoter Score

sNPS = Sales Net promoter Score

sNPS = Service Net Promoter Score

Service level

Global Coverage

This PC is serviceable/Supportable across the world

Country Coverage

This PC is serviceable/Supportable only in the country where it was purchased.

Next Avail Tech Resource Remote

When Customer reaches Tech support whoever is available in the tech support will provide support to the customer.

Next Avail Tech Resource Onsite

When Customer is getting an Onsite Tech support whoever is available in the Onsite support will provide support to the customer

Std Office Hrs Std Office Days

No Weekends support and between timings are standard (In-General)

Standard Material Handling

Regular material shipments

No Usage Limitation

Can claim warranty under terms for any number of times

Next Cov Day Onsite Response

One business day on Onsite Response is available

Next Coverage Day

Service Response is on Next day

Standard Parts Logistics

Standard Part shipment

Accidental Damage Coverage (ADP)

Coverage of Accidents/liquid spill

How is your Training Plan Designed?

Hardware Module Evaluation

OS Module Evaluation

Network Module Evaluation

Final Evaluations

70% is the Passing Score in all the Evaluations and in Final Evaluations.

Serial Number

It is 10 Digit Unique Alphanumeric Number to identify your HP PC/Monitor/Dock.

Different ways to find the Serial Number

Serial number, product number, model number, warranty details etc.

S/N

1. Base enclosure – Bottom enclosure /Base Enclosure of the Laptop and Top enclosure of the Desktop.
2. BIOS setup utility.
3. HP Support Assistant. (HPSA)
4. (laptops) Fn + esc = this will Provide the serial number, Ctrl + Alt + S(Desktop)
5. Command prompt = wmic bios get serialnumber.
6. Bill Copy (only for INDIA customers).

How to Decode HP PC Serial Number

CND1051234

CND 1 05 1234

C= China
I= India
S = Singapore
M= Malaysia
J= Japan

CN = Country of Assembly (C = China, IN = India, SG = Singapore, IM= Malaysia)
D = Site Code

2021
2020
2019
2018
2017
2016
2015
2014
2013
2012

4 = Year of Assembly/manufacture
The last 10 years last number.
05 = Week
1234 = Lot code
OEM = Original Equipment manufacturers for Microsoft.

Manufacturers ->Distributors -> Resellers (Can be more) ->Customer

What is Obsolete Unit = Product manufacturing stopped = 1 year

EOSL = End of Support Life = Products Supports life stopped= 5 years

5CG7415FWT
INA618R2QR
8CG8513C2N
CND5305JFM

SGH237SLL4

Product Number / SKU number = Stock Keeping unit

6 to 8 alphanumeric
Y3R94UCR#ABA
Country of the pc designed for = USA
#ACJ = INDIA

R before the # tag refers to the PC is a Refurbished PC

HP refurbished Warranty = 90 Days

1y 1y 1y
3y 3y 1y
3y 3y 0y

1Y 1Y 1Y
Support/parts/On-site

Care-paq
Contract
OOW = Out of warranty
INW = In warranty

Base Warranty / Manufacturer Warranty

No Power, No Display, No Boot, No Post

Beeps and Blink Codes

Red = Major, White= Minor

2 = BIOS

3 = Any HW component apart from system board

3.2 = Memory

3.3 = Graphics

3.4 = Power

3.5 = Processor

4 = Thermal/Fan issue

5 = System-board issue

Power

SMPS = Switch Mode Power Supply

PSU = Power Supply Unit

AC Adapter

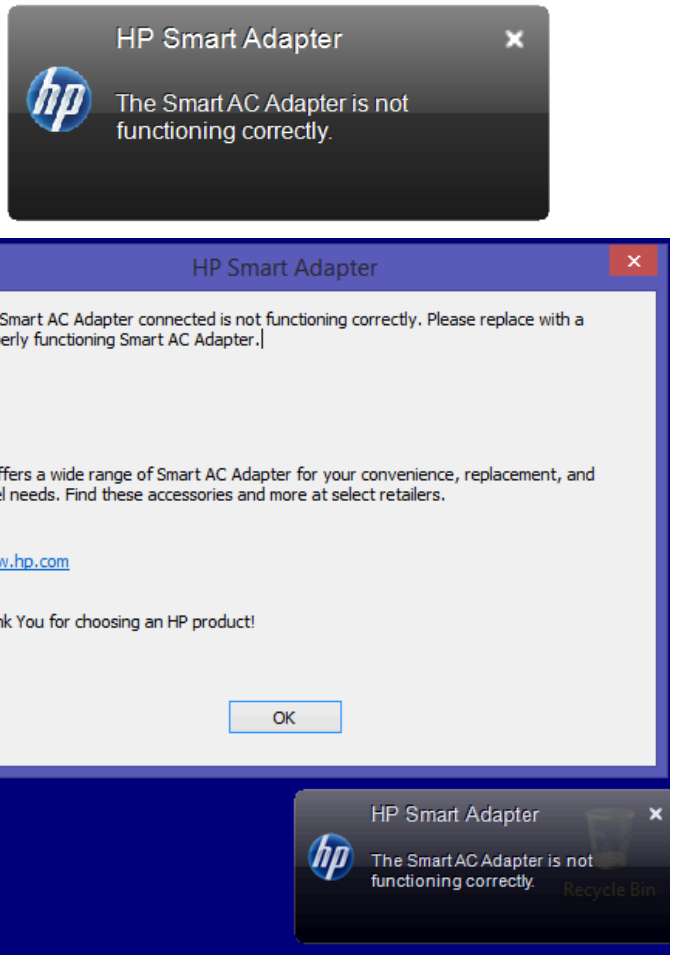
Types of HP AC Adapters available for Notebooks and All-in-One PC's

Newer Blue Pin Smart Adapters (4.5mm barrel)

Black Pin Smart Adapters (7.4mm barrel)

HP USB-C Power Adapter


HP Smart Adapter
HP offers a wide range of Smart AC Adapter for your convenience, replacement, and travel needs. Find these accessories and more at select retailers.
The Smart AC Adapter connected will power your computer, but potentially at a reduced performance level. Your computer is designed to vary performance as needed when a smaller capacity Smart AC Adapter is connected. Resource intensive tasks may cause your system not to perform at its highest level with a smaller capacity Smart AC Adapter. Please connect a higher capacity Smart AC Adapter for full performance.
Thank You for choosing an HP product!
OK



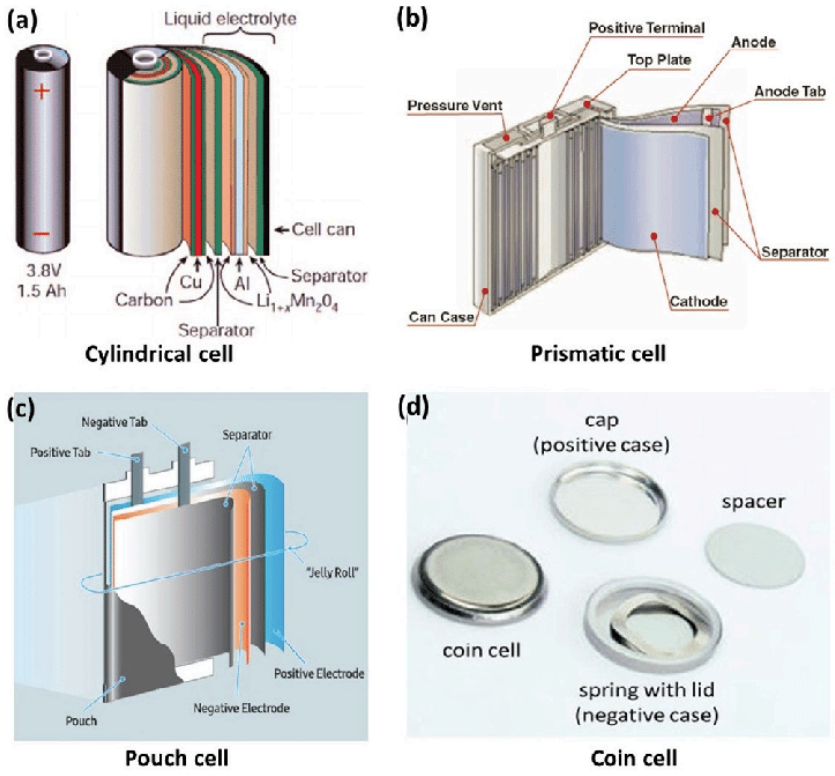
Electromagnetic compatibility, or EMC means that a device is compatible with (no interference is caused by) its electromagnetic (EM) environment and it does not emit levels of EM energy that cause electromagnetic interference (EMI) in other devices in the vicinity.

PFC

Power Factor Correction

PSU Load	Certification						
	Unrated	80 PLUS	80 PLUS BRONZE	80 PLUS SILVER	80 PLUS GOLD	80 PLUS PLATINUM	80 PLUS TITANIUM
20%	Efficiency: 70%	Efficiency: 80%	Efficiency: 82%	Efficiency: 85%	Efficiency: 87%	Efficiency: 90%	Efficiency: 92%
50%	Efficiency: 70%	Efficiency: 80%	Efficiency: 85%	Efficiency: 88%	Efficiency: 90%	Efficiency: 92%	Efficiency: 94%
100%	Efficiency: 70%	Efficiency: 80%	Efficiency: 82%	Efficiency: 85%	Efficiency: 87%	Efficiency: 89%	Efficiency: 90%

Figure 2 - 80 PLUS Certification Tiers



BATTERY IS A CONSUMABLE PART

Without a Valid Failure id battery will not be replaced.

Differentiate the Battery

Lithium-ion XL Battery (Xtra Life)

Warranty: 3 years

Cycle count: 1000 Cycles

Lithium-ion CL Battery (Normal Battery)

Warranty: 1 year

Cycle Count: 300 cycles

Design Capacity: 53 WHr

Full Charge Capacity: 49 WHr

Cycle Count

One Full Charge and One Full Discharge of a battery is called as One Cycle.

Battery calibration:

Charge and discharge the PC for 3 times

3rd party products being used

Environmental dispose reasons

Battery Bulging

Battery Test:

HP Support Assistant

HP UEFI Diagnostics

HP Hardware Diagnostics for windows

LAPTOP

NOTEBOOK

Lightweight Analytical Platform Total Optimized Power

ACPI power states

Advanced configuration power interface

S0 = System is fully functioning (usable)

S0 LPI (Low power Idle) = Modern standby (Sleep) = SOC = System On chip Devices.

S1 = Sleep

Common Computers will have removable components

S2 = Sleep

SOC Computers

All components are soldered – High in efficiency.

S3 = Sleep (Hybrid Sleep)

S4 = Hibernate

S5 = Full shutdown

G3 = Mechanical off

ASSY-BATT 3C 41W 3.6A LI HT03041XL-PR+PL

Assembly – Battery 3 Cell 41 Wattage 3.6 Ampere Lithium Ion HT03041Xtra Life -PR+PL

65W ADPTR nPFC S-3P 4.5MM

65 wattage Adapter Non-Power Factor Correction S-3P 4.5 MM Barrel

---

–

Cycle count: One full charge and full discharge of battery is called as a Cycle count

Example: I charge the battery to 100%

Discharge it only till 50% and again charge it to 100% = half cycle

Discharge it only till 50% and again charge it to 100%= Full cycle

Battery controller: It is a Chip that controls the battery

Cycle /charge counters (Explanation to be given)

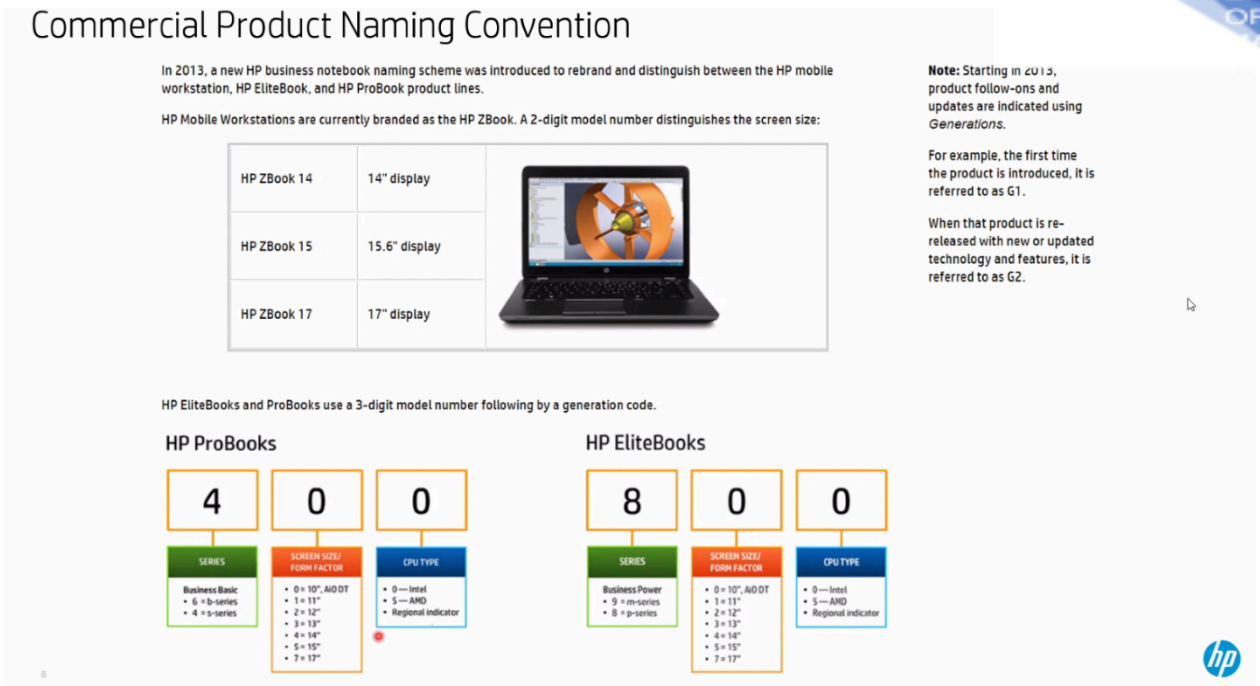
Battery is a Consumable part.

1. Battery test: ok

   Battery will not be replaced
2. Battery TEST SHOWS Failed

   Battery will be replaced if the failure id is accurate / Battery Cycle count will be checked.
3. Battery test shows Calibrate

   You will do Calibration.



Power Drain /Power Reset/Hard Reset

This Method is used to remove Static Electricity / Residual Charge and Clears the memory and reestablishes the software connections between the BIOS and the hardware, which might restore Functionality.

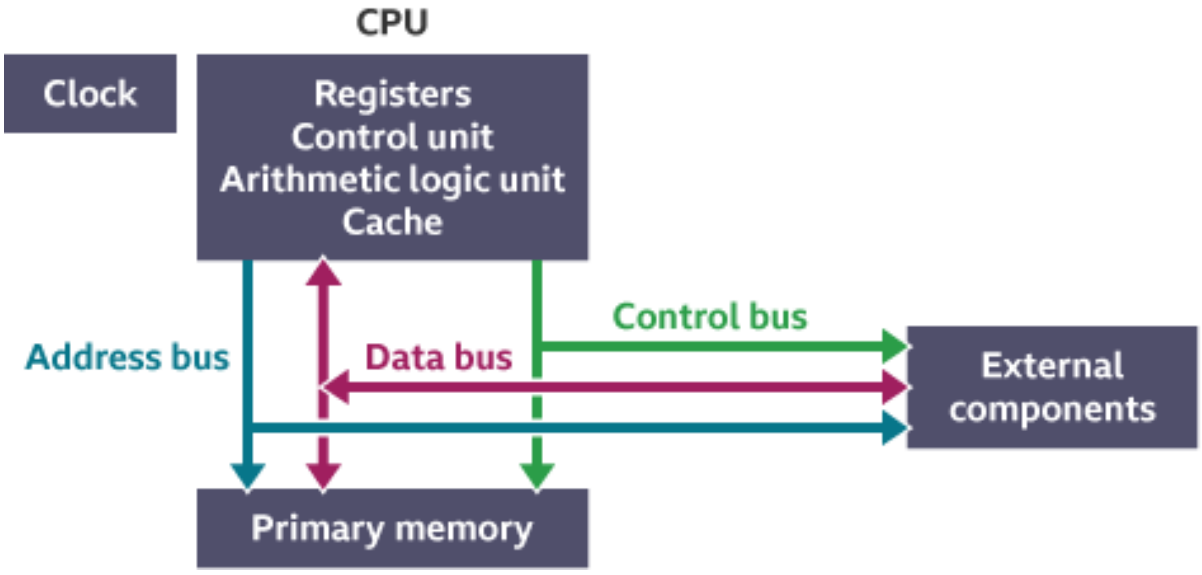
https://support.hp.com/sg-en/document/ish_1997208-1551050-16

https://www.youtube.com/watch?v=5o1DG1lAqlw

https://www.youtube.com/watch?v=5NJQM8vJa9Q

How to do power drain

1. Remove all the Main power connections (Ac adapter/power chord/battery (for non-concealed)
2. Remove all the Devices (Removable)
3. Press and Hold the power button for 15 seconds



https://www.youtube.com/watch?v=HEjPop-aK_w

Processor

Binary Processing

https://www.youtube.com/watch?v=Xpk67YzOn5w

Tower/Cabinet/Chassis

CPU = Central processing Unit /Processor

Control unit (CU)

The CU provides several functions:

- it fetches, decodes, and executes instructions
- it issues control signals that control hardware components within the CPU
- it transfers data and instructions around the system

Arithmetic logic unit (ALU)

The ALU has two main functions:

- it performs arithmetic and logical operations (decisions).
- it acts as a gateway between primary storage and secondary storage - data transferred between them passes through the ALU.

Registers

Registers are small amounts of high-speed memory contained within the CPU. They are used by the processor to store small amounts of data that are needed during processing, such as:

- the address of the next instruction to be executed
- the current instruction being decoded
- the results of calculations

Different processors have different numbers of registers for different purposes. Most have some, or all, of the following:

- program counter (PC)
- memory address register (MAR)
- memory data register (MDR)
- current instruction registers (CIR)
- accumulator (ACC)

Cache

Cache is a small amount of high-speed random-access memory (RAM) built directly within the processor. It is used to temporarily hold data and instructions that the processor is likely to reuse. This allows for faster processing, as the processor does not have to wait for the data and instructions to be fetched from the RAM.

Clock

The CPU contains a clock which, along with the CU, is used to coordinate all the computer's components. The clock sends out a regular electrical pulse which synchronizes (keeps in time) all the components.

The frequency of the pulses is known as clock speed. Clock speed is measured in hertz (Hz). The greater the speed, the more instructions can be performed in any given moment of time.

In the 1980s, processors commonly ran at a rate of between 3 megahertz (MHz) and 5 MHz, which is 3 million to 5 million pulses or cycles per second. Today, processors commonly run at a rate of between 3 gigahertz (GHz) and 5 GHz, which is 3 billion to 5 billion pulses or cycles per second.

Buses

A bus is a high-speed internal connection. Buses are used to send control signals and data between the processor and other components.

Three types of bus are used.

- Address bus - carries memory addresses from the processor to other components such as primary storage and input/output devices. The address bus is unidirectional.
- Data bus - carries the data between the processor and other components. The data bus is bidirectional.
- Control bus - carries control signals from the processor to other components. The control bus also carries the clock's pulses. The control bus is unidirectional.

Architecture: 32 bit and 64 bits

Heat sink: Aluminum or copper heat sink with Fan

Speed: Hertz

Clock rate

Millions of cycles per second /millions of Pulses per second

MHZ to Ghz

Billions of cycles per second

Cache: Cache is a small area of processor where duplicate entries of frequentl instructions are

stored.

Packaging:

PGA = Pin Grid Array

FCPGA = Flip Chip Pin Grid Array

BGA = Ball Grid Array

LGA = Land Grid Array

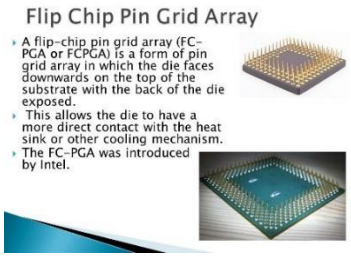
Integrated CPU (Soldered with system board)

Packaging:

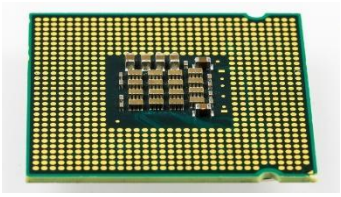
Dual In line Packaging

Pin Grid Array:

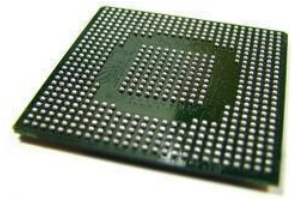
FLIP-Chip PIN Grid Array:



Land Grid Array:



BALL Grid Array:



SOC = System on CHIP

Cores:

It is a Physical CPU on a Single Chip

Dual core, quadcore, hexacore, Octa core

SMART Cache: All the processor Cores will be utilizing the Cache memory.

Hyperthreading - Multithreading

It is available only for Intel processors

It is not a physical core – it's a logical core in the eyes of Operating system.

Base Frequency: Hertz

This is the Average Speed of the Processor.

Intel Turbo Boost:

Automatically allowing CPU Cores to run faster than the base frequency.

Cooling Systems:

Thermal paste is used for better Heat Dissipation.

Air cooling

- Aluminum Air fins.
- Copper Air Fins.
- Carbon Air Fins.
- Gold Plated Air Fins.

Liquid Cooling

- Gel Cooling.
- Water Cooling.

Intel Processors:

- Core
  I3 = 15W to 65W
  I5 = 65W to 125W
  I7 = 35W to 125W
  I9 = 35W to 125W
  X = 165W

- Pentium
- Celeron
- Atom
- Xeon
- Movidius

TDP = Thermal Design Power

Chipset:

Chipset is a group if interdependent chips that control the flow of instructions between the CPU, Memories, peripherals, I/O Devices.

Chipset is the Backbone of the PC

Memory Controller
Universal Serial Bus Controller
Storage Controller
Graphics Controller
Audio Controller
PCI Controller

CPU and High specs Communications = North Bridge

Communication Hub for storage, Ports, Network, etc. = South Bridge (South bridge is connected to North Bridge)

North Bridge is now inbuilt inside the CPU itself.

South Bridge is now called as PCH (Platform Control HUB)

Intel Generations: (i3,i5,i7, i9, iX)

Nehalem = 1
Sandy Bridge = 2
Ivy Bridge = 3
Haswell = 4
Broadwell = 5
Skylake = 6
Kabylake = 7
Coffee Lake = 8, Whiskey Lake = Ultraportable
Cannon Lake = 9
Ice lake = 10, Comet lake = Ultraportable

Intel Releases New Generation of CPU every year

K = Overclockable
F = No Integrated Graphics
G = Advanced Integrated Graphics
U = Ultra Low Power Consumption
T = Optimized for Power Efficiency not as U
H = Advanced Graphics Chip
HK = Graphics chip and Unlocked
HQ = Graphics chip and Quad core
Y = Low Power consumption

AMD also has its Precision Boost Overdrive (PBO) technology

Intel Turbo Boost Technology:	--	Precision BOOST 2
Intel V pro Technology:	--	AMD Dash Management Protocol
Intel Rapid Storage Technology:	--	AMD Store MI
Intel Smart Response Technology:		
Intel WIDI:	--	AMD Wireless Display
Intel Hyper Threading	--	Simultaneous Multithreading (SMT)

Intel® Virtualization Technology for Directed I/O (VT-d)

Yes

Intel vPro® Platform Eligibility

Yes

Intel® ME Firmware Version

14

Intel® HD Audio Technology

Yes

Intel® Rapid Storage Technology

Yes

Intel® Rapid Storage Technology enterprise

No

Intel® Standard Manageability

Yes

Intel® Stable Image Platform Program (SIPP)

No

Intel® Smart Sound Technology

Yes

Intel® Platform Trust Technology (Intel® PTT)

Yes

Security & Reliability

Intel® Trusted Execution Technology

Yes

Intel® Boot Guard

Yes

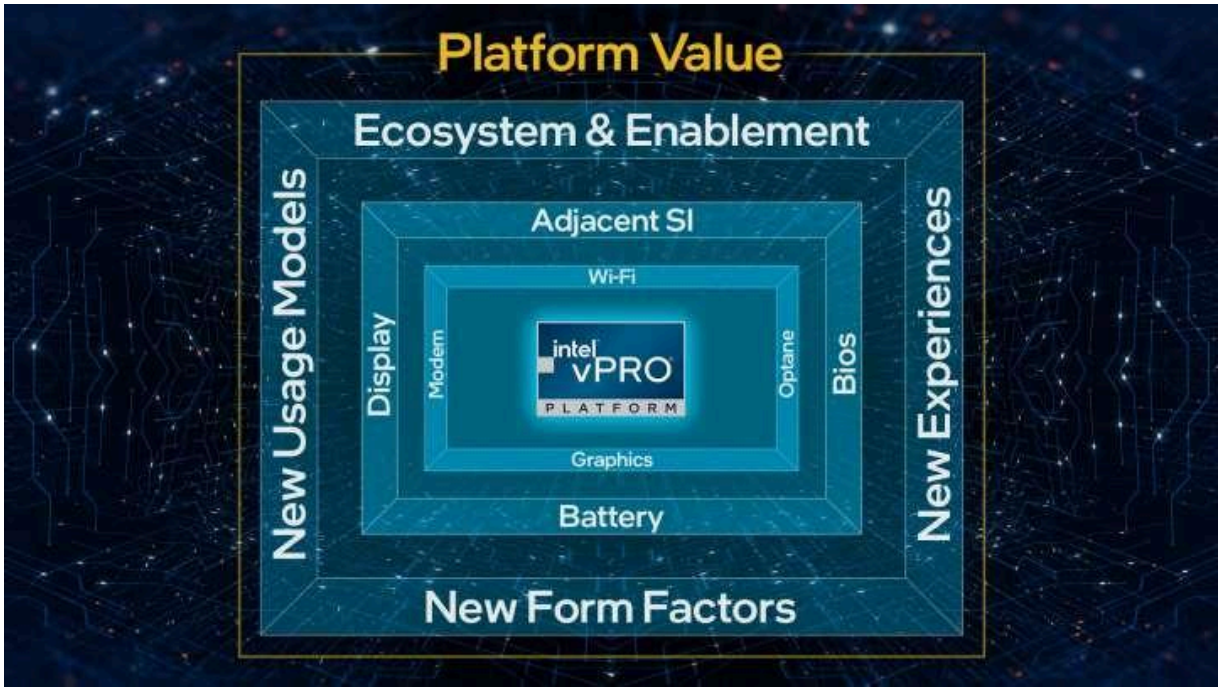
UMA = Unified Memory Architecture.
AMD = APU (Accelerated processing unit)

Intel = Integrated Graphics.
It used the RAM as the memory for to process graphics.

Non-UMA /Discrete Graphics/ Dedicated Graphic cards = It will have their Own Dedicated Memory.

Intel V pro

https://www.intel.in/content/www/in/en/architecture-and-technology/vpro/vpro-platform-general.html



1. Hyperthreading
2. Turbo boost
3. Virtualization
4. Active management technology (AMT)
5. Encryption

APU:

- Accelerated Processing Unit
- Integrated Graphics

A MegaTransfer (MT) is a unit of measurement that refers to the rate of signal on parallel I/O buses (like SCSI) where the data transfer rate depends upon the amount of data transferred in each data cycle, and is independent of the width of the bus. MegaTransfer is abbreviated at MT and is commonly seen written in the per second form; MT/s or MT/Sec.

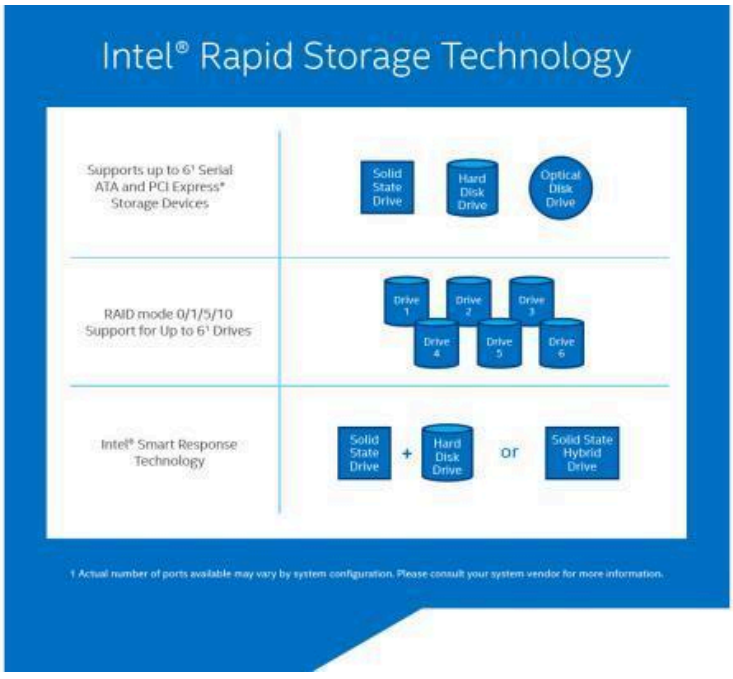
A 10 MT/sec rate on a 1-byte wide (narrow) bus results in a 10 Mbytes/sec transfer rate, but on a 2-byte (wide) bus, it is a 20 Mbytes/sec transfer rate.

IRST:

https://www.intel.in/content/www/in/en/architecture-and-technology/rapid-storage-technology.html

Intel Rapid Storage Technology RAID support includes the following levels of performance and reliability:

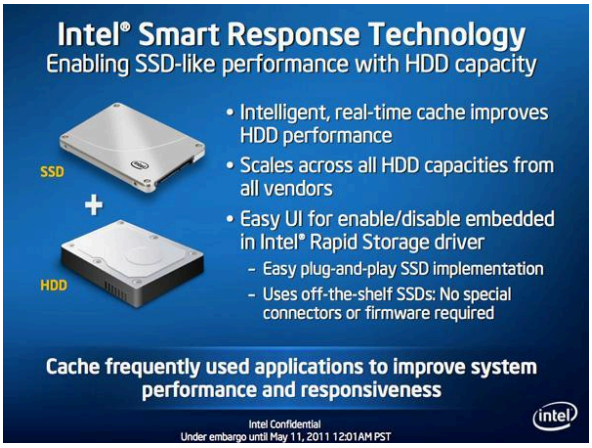
- RAID level 0 (Striping)
- RAID level 1 (Mirroring)
- RAID level 5 (Striping with parity)
- RAID level 10 (Striping and mirroring)



ISRT:

https://www.intel.in/content/www/in/en/architecture-and-technology/smart-response-technology.html

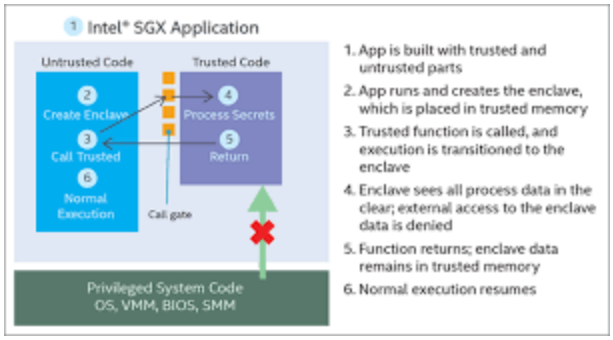
Intel Smart Response Technology is a feature of Intel Rapid Storage Technology enables either a dual drive—lower-cost, small-capacity SSD used in conjunction with a low-cost, high-capacity hard disk drive (HDD)—or a solid-state hybrid drive (SSHD) to provide a high-performance, cost-effective storage solution.



Intel Software Guard Extensions:

Intel Software Guard Extensions (Intel SGX) is a set of instructions that increases the security of application code and data, giving them more protection from disclosure or modification. Developers can partition sensitive information into enclaves, which are areas of execution in memory with more security protection.

https://software.intel.com/content/www/us/en/develop/topics/software-guard-extensions.html



Memory

It is a Working memory.

Primary Memory, Main Memory, ON Memory, RAM

Random Access Memory

Dynamic memory and Static memory

Dynamic Memory (Volatile memory) = The Data will not be saved if there is no Power.

RAM

Static memory (Non-Volatile Memory) = The Data will be saved if there is no Power.

ROM, HDD, CD, DVD, SD Card.

RAM used Capacitors

DRAM = Dynamic Random-Access Memory

SDRAM = Synchronous Dynamic Random-Access Memory

DDR 1 = Double Data Rate 1 Synchronous Dynamic Random-Access Memory

DDR2 = Double Data Rate 2 Synchronous Dynamic Random-Access Memory

DDR3 = Double Data Rate 3 Synchronous Dynamic Random-Access Memory

DDR4 = Double Data Rate 4 Synchronous Dynamic Random-Access Memory

DDR5 = Double Data Rate 5 Synchronous Dynamic Random-Access Memory

MDDR = Mobile Double Data Rate

LPDDR = Low Power Double Data Rate

Memory Type	Release Year	Bandwidth	Voltage (V)	Prefetch
SDR	1993	1.6 GB/s	3.3	1n
DDR	2000	3.2 GB/s	2.5/2.6	2n
DDR2	2003	8.5 GB/s	1.8	4n
DDR3	2007	17 GB/s	1.35/1.5	8n
DDR4	2014	25.6 GB/s	1.2	8n
DDR5	**2019**	**32GB/s**	**1.1**	**8/16n**

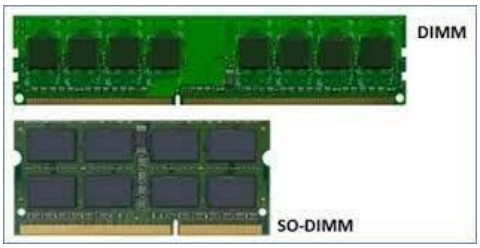
Storage = Giga Bytes

Transfers = Giga Bits

Memory Slots

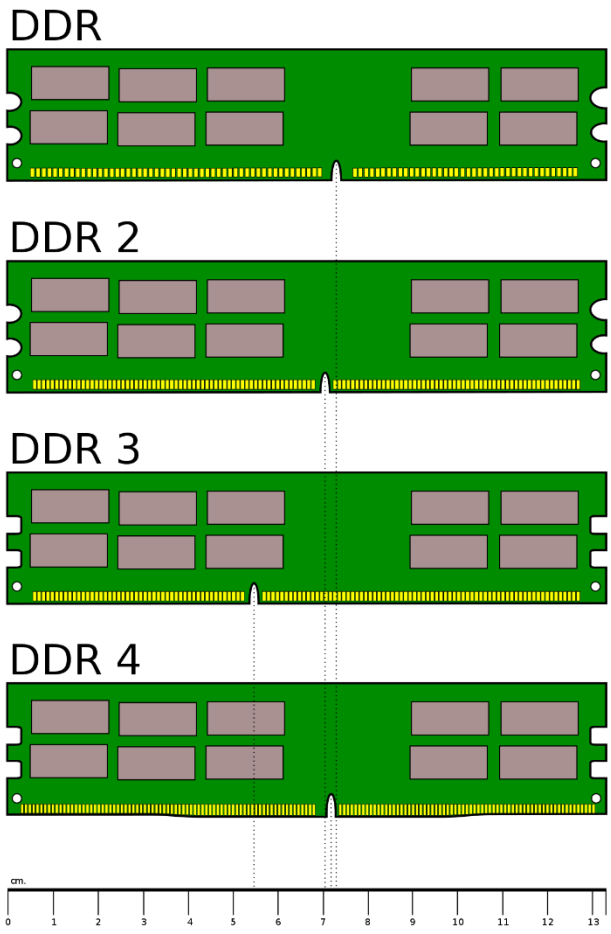
DIMM = Dual Inline memory Module (Desktops)

SODIMM = Small Outline Dual Inline Memory Module (Notebooks/laptops)



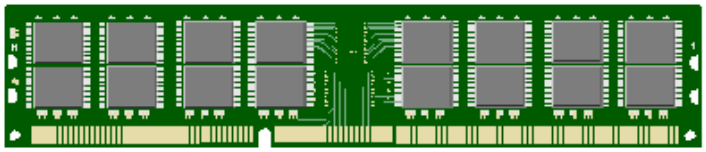
SODIMM 8GB 2666MHz 1.2v DDR4

Small Outline Dual Inline Memory Module 8 Giga Bytes 2666-Megahertz 1.2 voltage Double Data Rate 4

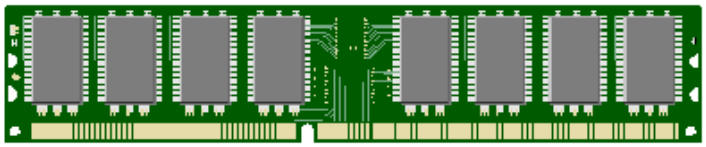


DIMM MODULES

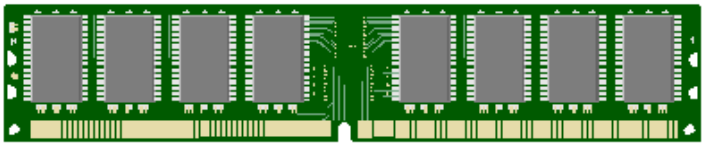
DDR4 - 284-pin DIMM



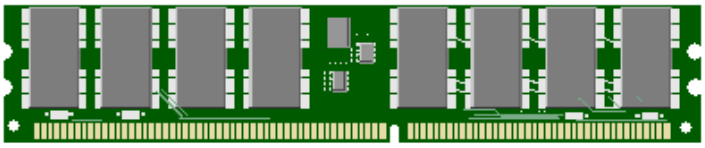
DDR3 - 240-pin DIMM



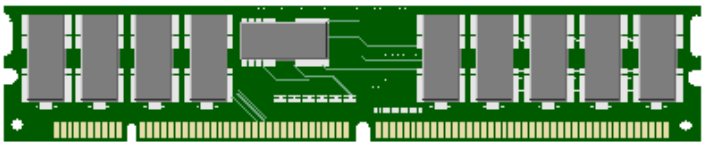
DDR2- 240-pin DIMM



DDR - 184-pin DIMM

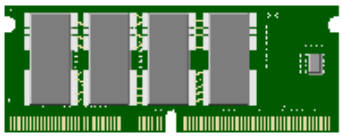


SDRAM, FPM, EDO - 168-pin DIMM

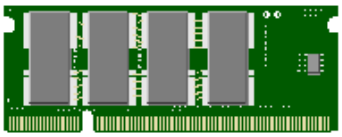


SODIMM MODULES

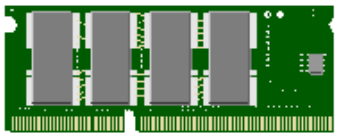
DDR4 - 256-pin SODIMM



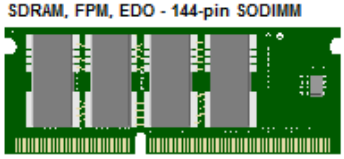
DDR and DDR2 - 200-pin SODIMM



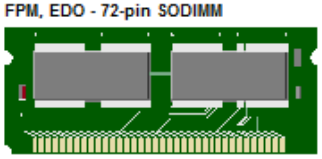
DDR3 - 204-pin SODIMM



SDRAM, FPM, EDO - 144-pin SODIMM



FPM, EDO - 72-pin SODIMM



PC1 = DDR1, PC2 = DDR2, PC3= DDR3, PC4= DDR4, PC5 =DDR5

ECC = Error Correction Check

Non ECC= Non-Error Correction Check

Memory Channel

- Single Channel
- Double Dual Channel
- Triple Channel
- Quad Channel

Optane Memory

Virtual Memory

Transfers per second

1M/Ts: Mega Transfer Per Second: 1 MT/s is 106 or one million transfers per second

Storage

Virtual Memory

Non-Volatile memory

https://www.youtube.com/watch?v=kdmLvl1n82U

Secondary Storage Devices:

Two Form Factors of the Storage in the PC:

1. Mechanical Hard Disc Drive (HDD)
   Tracks and Sectors
   Performance = RPM = Revolutions per minute
   5200, 7200, 9000, 10200

2. Solid State Drive (SSD)
   Cells = Flash memories.
   SLC = Costlier and used for servers = Single Level Cell
   TLC = Our PCs = Triple Level Cell
   MLC = Our PCs = Multi Level Cell

Interface of the Storage in the PC:

1. IDE = Integrated Data Electronics

2. PATA = Parallel Advanced Technology Attachment

3. SATA 1 = Serial Advanced Technology Attachment
   1.5Gb/s (Power Pin = 15, Data Pin = 7)

4. SATA 2 = 3.0Gb/s (Power Pin = 15, Data Pin = 7)
5. SATA 3 = 6.0Gb/s (Power Pin = 15, Data Pin = 7)

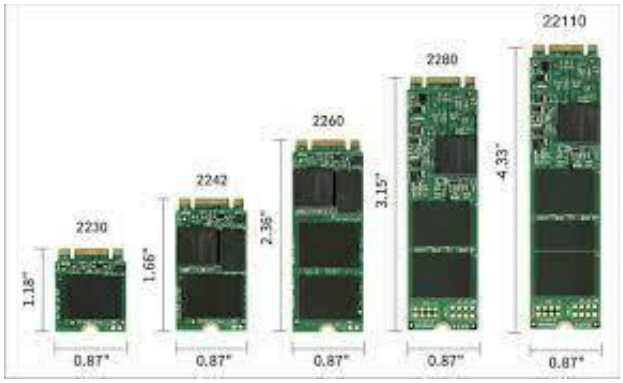
SATA DATA CABLE = 7 Pin

SATA Power PIN 15 PIN

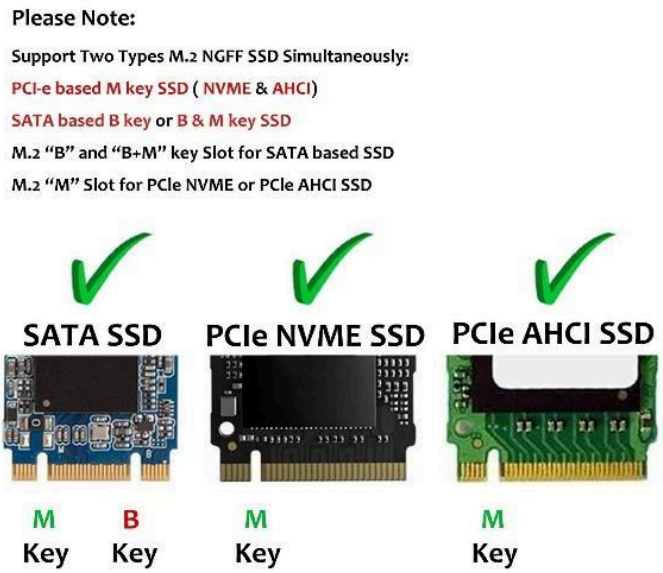
6. SATA 3.1 = 6.0Gb/s (mSATA) Mini SATA

7. SATA 3.2 = 14Gb/s (M.2) is also called as NVME (Non-Volatile Memory Express)
8. SED = Self Encrypting Drives

M.2 = Form Factors



M.2 Keys = 



A key and E Key = it is for Non-Storage Devices (WIFI Card)

B key and M Key = it is for Storage Devices regular M.2 SSD

B only or M Only is also for storage Devices (M.2 NVME) Non-Volatile memory Express

SSHD = Solid State Hybrid Drive

Partitioning Table:

How many sectors, how many tracks, how many sectors used and how many sectors are corrupt, how many sectors are available…….

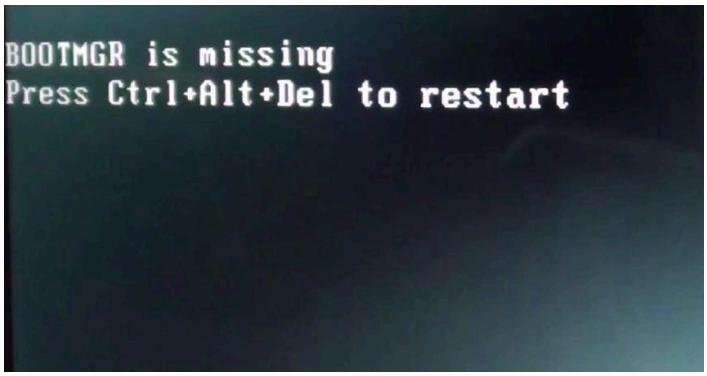
SSD How many Cells, how many Cells used and how many Cells are corrupt, how many Cells are available…….

MBR and GPT
MBR Supports: OS 7, 8.1 and 10

Master Boot Record

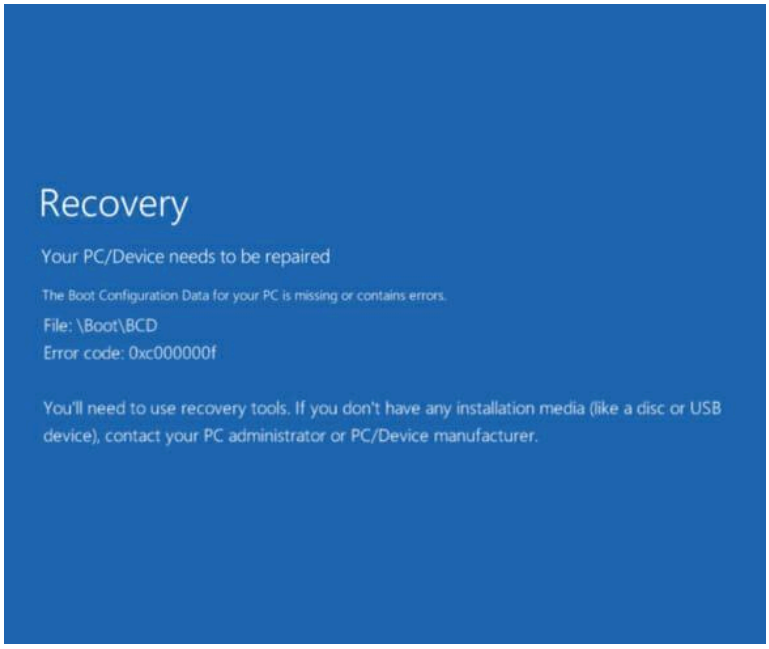
1 – 4 Primary Partitions.
2 – 2TB is the maximum partition size.
3 – Supports only for Legacy BIOS.
The available size for block addresses and related information is limited to 32 bits

For hard disks with 512-byte sectors, the MBR partition table entries allow a maximum si
The protective MBR is stored at LBA 0 (Logical Block Addressing)



GPT
Guide Partitioning table
(Globally Unique Identifier Partitioning Table)

1 – 128 Primary Partitions.
2 – 9.4ZB is the maximum Partition size.
3 -Fully compatible with modern generations BIOS(UEFI).
4 GPT uses 64 bits for logical block addresses
5 For disks with 512-byte sectors, the maximum size is 8 ZiB
6 GPT header is in LBA 1 (Logical Block Addressing)
7 The GPT header has a pointer to the partition table which is typically at LBA 2 (Logical Block Addressing)



Logical block addressing (LBA) is a common scheme used for specifying the location of blocks of data stored on computer storage devices, generally secondary storage systems such as hard disk drives. LBA is a particularly simple linear addressing scheme; blocks are located by an integer index, with the first block being LBA 0, the second LBA 1, and so on.

Grinding Noise and Clicking Noise in mechanical HDD.

SMART = Self-Monitoring Analysis Reporting Technology.

DST Failed (Disk Self-Test)
301
302

3F0

- Bit
- Byte
- Kilobyte
- Megabyte
- Gigabyte
- Terabyte
- Petabyte
- Exabyte
- Zettabyte

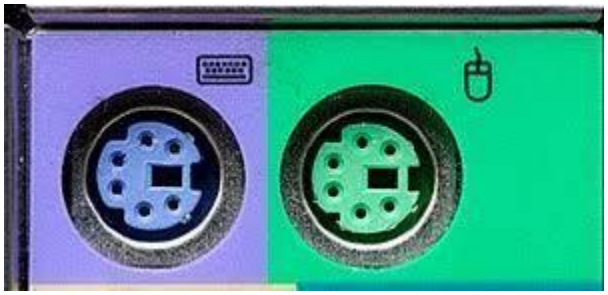
- Yottabyte
- Brontobyte
- Geopbyte

Secondary Storage Devices:

CD Compact Disc = 700 MB
DVD Digital Versatile Disc= Blu ray DVD 16GB
USB Universal Serial Bus = Flash Drives.

Raid 0,1,5,10

Ports:
Input Ports = Input Devices

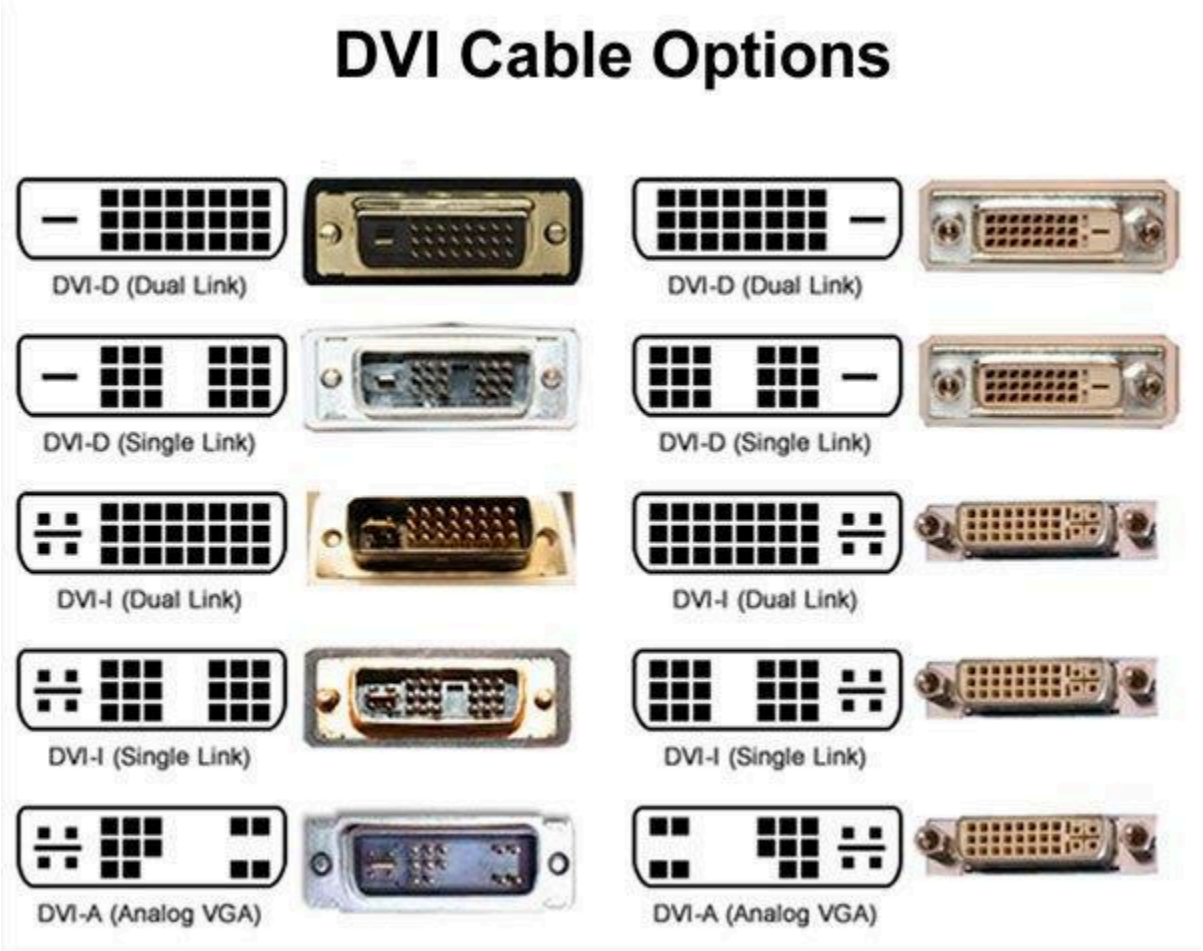


Output Ports = Output Devices.

Output Ports:

VGA = Video Graphics Adapter = 15 Pins = Analog Port.

DVI = Digital Visual Interface.



HDMI = High-Definition Multimedia Interface.
4K Resolution and 8K Resolution with maximum bandwidth, with HD Sound.

DP Port = Display Port.
4K Resolution and 8K Resolution with maximum bandwidth, with HD Sound.
More bandwidth in comparison to HDMI.

Thunderbolt Port
DP Port
High Data Transfer
PD (Power Delivery Port)
Security

1. No Security
2. User Authorization = Enter username and password.
3. Secure Connect = Security protocol Storage device it will ask for user authentication
4. Display port and USB = Only Allow Displays and USB KB/Mouse or devices which does not use data transmission.

Thunderbolt Port 1 (Apple) = 10 Gbps
Thunderbolt Port 2 (Apple) = 20 Gbps
Thunderbolt Port 3 (Intel) = USB C = 40 Gbps

Input Ports:

USB = Universal Serial Bus

Form factors

Icon	Specification	Supported Features
	USB 2.0	Data Transfer Speeds upto 480 Mb/s
SS	USB 3.1 Gen 1	Data Transfer Speeds upto 5 Gb/s
SS 10	USB 3.2 Gen 2	Data Transfer Speeds upto 10 Gb/s
SS	USB Charging Port	Power Out of upto 7.5 W Power out with BC 1.2 charge peripheral Devices
		Bidirectional Power - Upto 100W power in and 15W power out, depending on the supported power profile
20	USB 4.0 20	Data Transfer Speeds upto 20 Gb/s
40	USB 4.0 40	Data Transfer Speeds upto 40 Gb/s

Thunderbolt 4 Explained

The often confusing world of computer connectivity is now a two horse race, Thunderbolt 4 and USB4, and Thunderbolt has its nose in front. That's because Thunderbolt 4 is built on top of the upcoming USB4 standard and backward compatible with prior generations of Thunderbolt and USB products. We explain the Thunderbolt 4 standard and what you can expect from Thunderbolt 4-compatible products.

Transmission Speed = M.2 = 14 Gbps
Storage capacity = M.2 = 512 GB.

Docking stations

Thunderbolt Ports:

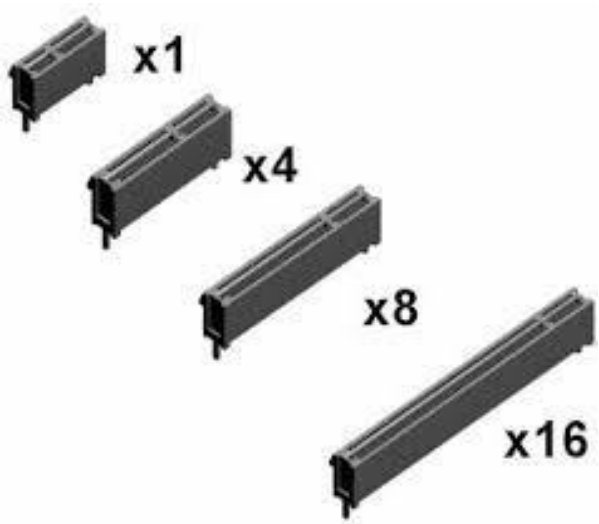
Data = speed up to 40Gbits ps.
Video = Up to 8K Resolution.
Sound = UHD Sound.
Power = (PD) = supply up to 100 watts of power.
Security

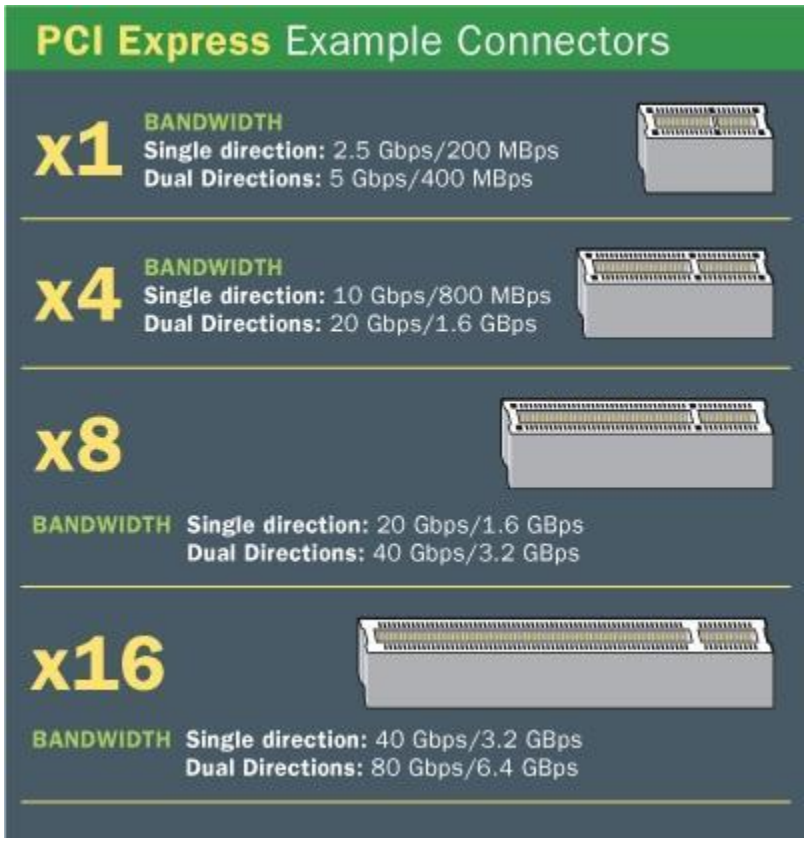
Expansion Slots

PCI Slots = Peripheral Component Interface

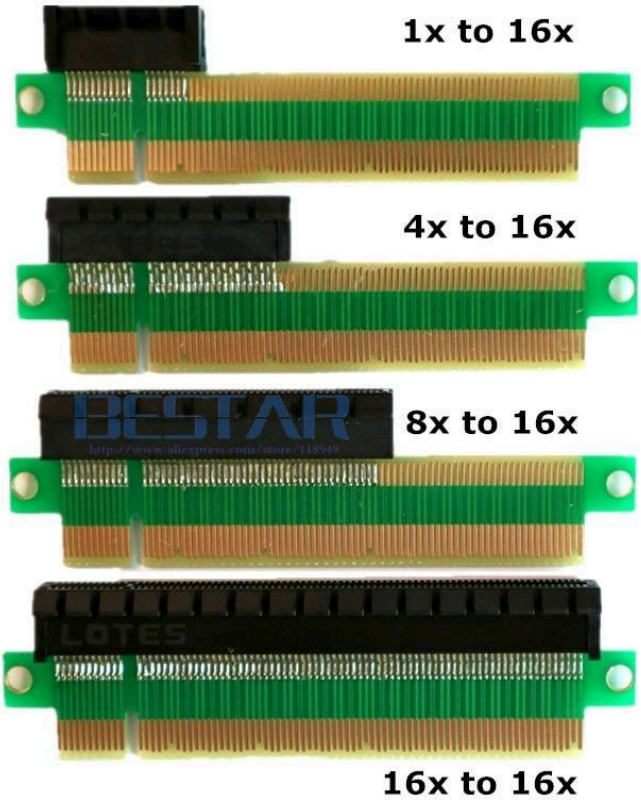

ALi
M1542 A1
100 MHz
TAIWAN
5ALI61REVF
AWARD
www.laptopoptimization.blogspot.com


HUANANZHI
HUANANZHI
210mm/8.27”
170mm/6.69”


x1
x4
x8
x16


PCI Express Example Connectors
x1
BANDWIDTH
Single direction: 2.5 Gbps/200 MBps
Dual Directions: 5 Gbps/400 MBps
x4
BANDWIDTH
Single direction: 10 Gbps/800 MBps
Dual Directions: 20 Gbps/1.6 GBps
x8
BANDWIDTH Single direction: 20 Gbps/1.6 GBps
Dual Directions: 40 Gbps/3.2 GBps
x16
BANDWIDTH Single direction: 40 Gbps/3.2 GBps
Dual Directions: 80 Gbps/6.4 GBps

PCI Express x16 Connector



Keyboards:

Super Keyboards/Symbol or function Keyboard: C06617170

1 – Mechanical Keyboard

2 - Silicon Membrane keyboard

- USB Port Keyboards
- PS/2 Port keyboards
- Serial Port Keyboards
- Wireless Keyboards
- Bluetooth keyboards

Performance measurement = Response Time.

Mouse: = Pointing device

- Track ball

- Ball Mouse

- Optical Mouse

- Laser Mouse

- Wireless Mouse

- Touchpads/Trackpads

- Click pad

Performance measurement = DPI = Dots per inch.

Performance measurement = Response Time.

Monitor /LCD:

CRT **=** Picture TUBE technology – Glass panel

LCD = Liquid Crystal Display = It is a Transparent panel.

https://www.youtube.com/watch?v=ZqbFGhM4Wrs

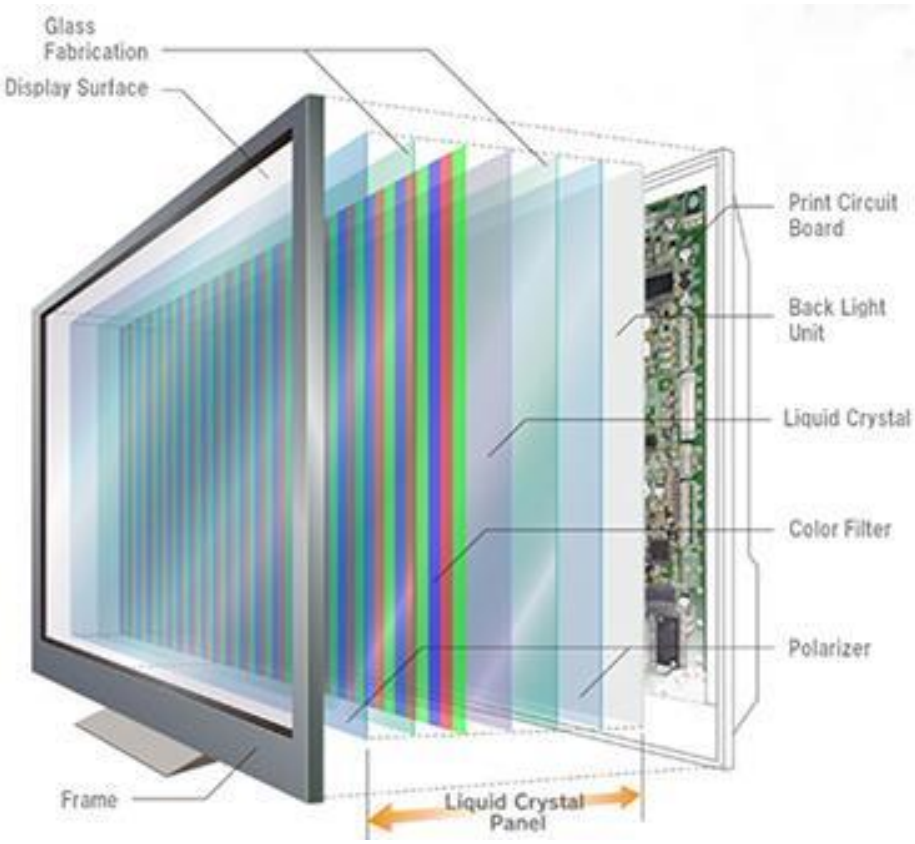
Display Filament:

CCFL = Cold Cathode Fluorescent lamp

TFT = Thin Film transistor

LED = Light Emitting Diode (LCD panel with LED Backlit)

AMOLED = Active-matrix organic Light emitting diode



LCD Panels:

TN :

TN w/LED backlight

Twisted Nematics (360 Degree viewing angle will have concerns)

IPS :

IPS w/LED backlight

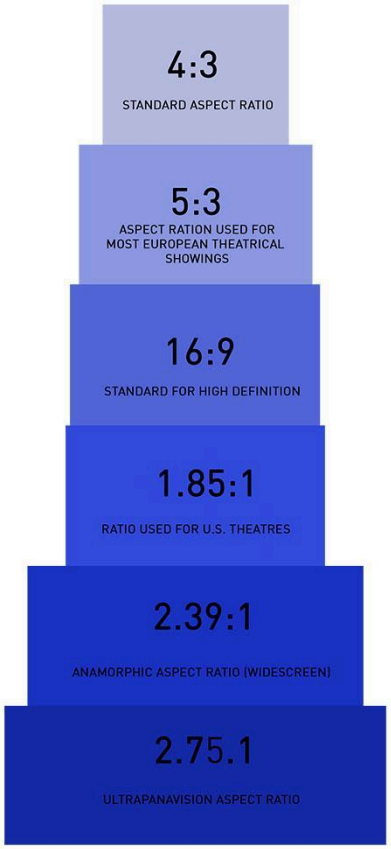
In Plane Switching (360 Degree viewing angle is good), Blacks are very Brighter, Brighter Screen,

VA :

Vertical Alignment

(360 Degree viewing angle is good), Blacks are very Brighter, Brightest Screen, Contrast ratio will be higher. Can offer more colors.

Aspect ratio: **16:9**



Resolutions

HD = 720p = 1280*720

Full HD = 1080p = 1920*1080

2k(QHD) = 1440p = 2560*1440

4k(UHD) = 3840*2160

8K = 7680*4320

Pixel:

Touchscreens: Digitizer

Brightness: 500 Nits for Gamers and CG = 1000nits.

Anti-glare:

256 Colors

Color Generation **:16 Million Colors.**

- **Nvidia G Sync**
- **AMD Free Sync**
- **Frame Rate**
- **Refresh Rate**
- **Response Time**

Display Issues:

Covered:

- **Vertical Line only**
- **Horizontal Line only**
- **Half Screen only**
- **Discoloration only**

Not Covered: (CID) = Customer Induced Damage.

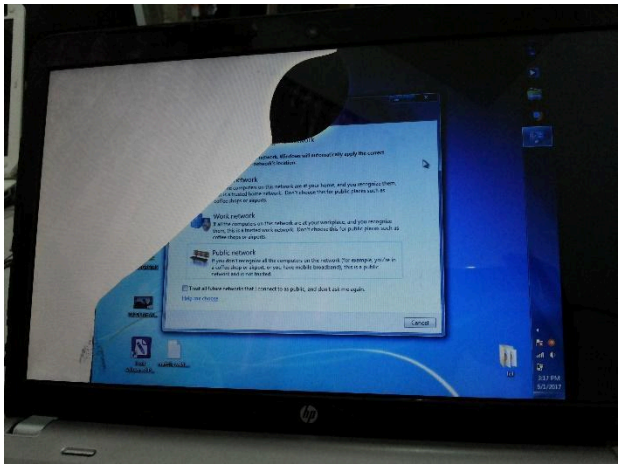
- **Diagonal Line**
- **Spider web crack**
- **Blotches**
- **Splotches**
- **Black/white/or any color spot**
- **Liquid inside the Screen**
- **Cracked Screen**
- **Bugs inside the screen**
- **PIXEL issues**

Two Full Images of the Display:

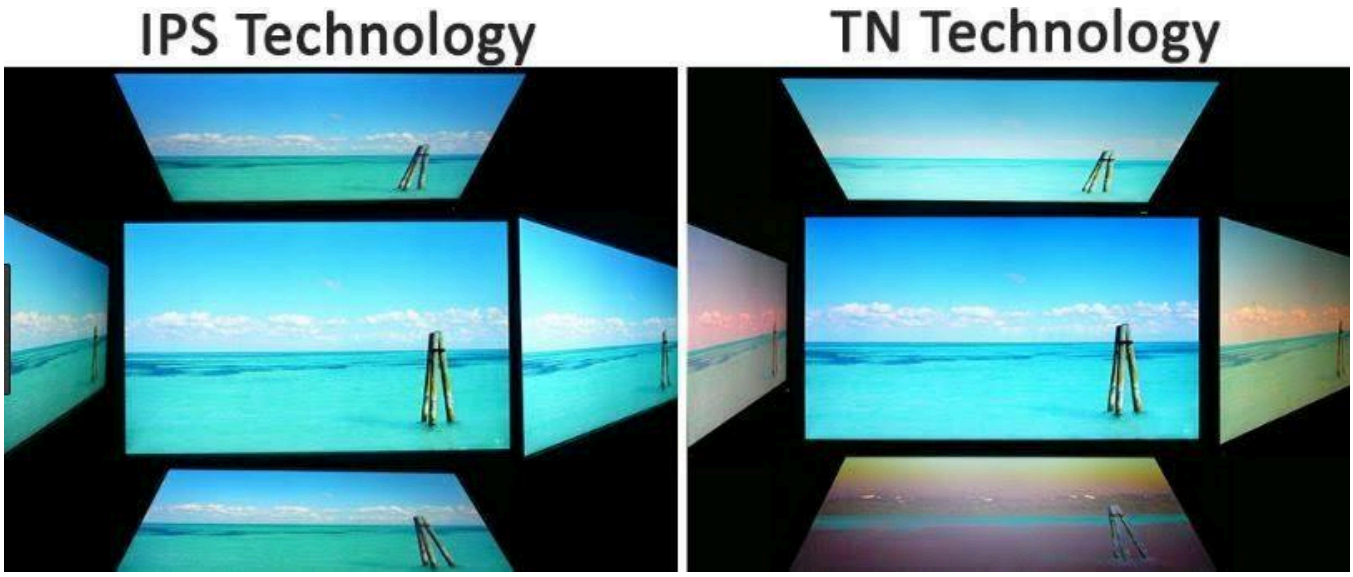
One in the BIOS /UEFI mode

One in the Desktop Mode

To HP support WhatsApp number/ Email.



IPS vs TN



Frame Rate:

Frame rate (expressed in **frames per second** or **FPS**) is the **frequency** (**rate**) at which consecutive images called **frames** appear on a display

Refresh rate:

A **refresh rate** defines how many times per second it draws a new image on the screen, and it's written out in Hertz (Hz). A 60Hz **refresh rate** means that the screen is refreshing itself 60 times every second, and at 120Hz, it's refreshing itself 120 times every second, 144Hz For Gaming monitors.

NVIDIA Sync:

G-Sync is a proprietary adaptive sync technology developed by Nvidia aimed primarily at eliminating screen tearing and the need for software alternatives such as V sync.

AMD Free Sync:

FreeSync is an adaptive synchronization technology for liquid-crystal and OLED displays that support a variable refresh rate, aimed at avoiding tearing and reducing stuttering caused by misalignment between the screen's refresh rate and the content's frame rate.

Screen Tearing:

Screen tearing is a visual artifact in video **display** where a **display** device shows information from multiple frames in a single **screen** draw. The artifact occurs when the video feed to the device is not in sync with the **display's** refresh rate.

Response Time:

Response time is the **time** it takes your **monitor** to shift from one color to another. Usually, this is measured in terms of going from black to white to black again, in terms of milliseconds. A typical LCD **response time** is under ten milliseconds (10 ms), with some being as fast as one millisecond.

Slower (higher) response time

Faster (lower) response time

SOUND

Sound moves through a medium such as air or water as waves. It is measured in terms of frequency and amplitude.

Frequency, sometimes referred to as pitch, is the number of times per second that a sound pressure wave repeats itself.

A drumbeat has a much lower frequency than a whistle.

The units of frequency are called hertz (Hz)

Humans with normal hearing can hear sounds between 20 Hz and 20,000 Hz.

Frequencies above 20,000 Hz are known as ultrasound.

Dogs = 45,000 Hz

Bats = 120,000 Hz

Below 20 Hz known as **infrasound**

Elephants use infrasound for communication, making sounds too low for humans to hear.

Low frequency sounds travel farther than high frequency ones, infrasound is ideal for communicating over long distances.

Amplitude is the relative strength of sound waves, and it is measured in Decibels.

How speakers Make Sound

https://www.youtube.com/watch?v=RxdFP31QYAg

Decibels **measure sound intensity**
Humans can hear sounds **between 0 and 140 decibels**.

Speakers:
Converts Electrical Signals to Sound Waves

Sub-Woofer:
Below a Woofer
20-200Hz

Woofer:
Broad Spectrum
20 – 2000HZ
Deep heavy Sounds

Tweeters:
2000 – 20000HZ – It uses Dynamic Drivers
Tweeters will be usually smaller

- Mono is audio coming from one channel.
- Stereo is audio coming from 2 channels
- Surround sound, on the other hand, is a mixing process.

Surround sound includes 2 channels and may include 5 speakers and 1 subwoofer, 7 speakers and 1 subwoofer, or up to 21 speakers and 1 subwoofer. It all depends on the number of speakers you want to mix in the process. As the term connotes, surround sound “surrounds” the listener with 360^{0} sound coming from the left, right, above, and below making the sound more realistic

Dolby Digital is considered the gold standard for surround sound. It uses specialized encoding and decoding technology to reproduce multichannel audio to deliver a cinematic sound experience in home theaters.

Dolby Digital programs deliver surround sound with 5 discrete full-range channels:

- Right
- Center
- Left
- Right Surround
- Left Surround

For the PC to make a sound, the stored digital waveform is clocked out through a digital to analog converter (part of the soundcard chip, which has one for each channel), then passed through an analog amplifier to a loudspeaker.

An **audio codec** is a device or computer program capable of encoding or decoding a data stream (a **codec**) that encodes or decodes **audio**.

codec (CO**der/**DEC**oder)**

In hardware, **audio codec** refers to a single device that encodes analog **audio** as digital signals and decodes digital back into analog.

- AAC = Advanced Audio Coding.
- MP3 = MPEG-1 Audio Layer III
- Dolby Digital
- Bluetooth

What is Stereo Mix in Windows?

Stereo Mix allows you to record exactly what was being output to your speakers, without going through any analog/digital conversion.

What is Intel Display Audio/AMD Digital Display Audio?

Connect a monitor on the other end of your HDMI or DisplayPort and it can play sound, you can send sound to that monitor by selecting "Intel Display Audio" or similar as your audio device.

Channel count

Each channel may substantially increase the encoded audio size, depending on contents and encoder settings.

High-definition audio:

HD audio, or high-definition audio, enables streaming music to sound more like an original studio recording. While the specifications for HD audio can vary, the term is generally used to refer to digital music formats that offer at least CD-quality mastering.

Audio files with greater than 44.1 kHz sample rate or higher than 16-bit audio bit depth.

High fidelity - Hi-Fi is a term used by listeners, audiophiles, and home audio enthusiasts to refer to high-quality reproduction of sound.

Sampling:

In signal processing, **sampling** is the reduction of a continuous-time signal to a discrete-time signal.

Conversion of a sound wave (a continuous signal) to a sequence of samples (a discrete-time signal).

Sampling rate:

A commonly seen unit of sampling rate is Hz, which stands for Hertz and means "samples per second". As an example, 48 kHz is 48,000 samples per second.

The Higher the Sampling Rate the quality of the Audio will be High.

Bit Rate:

Bitrate is the term used to describe the amount of data being transferred into audio. A higher bitrate generally means better audio quality.

IMAX:

IMAX already has a proprietary immersive sound format in its theaters, which consists of 12 channels of sound, 7 of them at the base level and 5 above.

Dolby Atmos:

Dolby Atmos audio in Dolby Digital Plus is typically encoded at bitrates between 384 and 768 kbps.

What is Dolby Atmos?

Dolby Atmos is a system that places speakers above the viewers. It creates superior moving audio that streams around you for an absolute home theater sound experience.

It simultaneously duplicates up to 128 audio objects to create a mix of breathtaking, realistic, and rich sound.

What is DTS:X?

Like Dolby Atmos, DTS:X.is an object-based surround sound technology that expands on conventional surround sound systems. Unlike Dolby Atmos, DTS:X has no requirements for additional height channels, or requirements for a specific number of speakers in any configuration. Instead, your DTS:X-enabled receiver does all the heavy lifting via its auto-calibration and object-based processor to deliver multi-dimensional sound to the output channel it decides is best. DTS:X also allows users to adjust the volume of voices. This is a handy feature for dialogue-heavy scenes, since they tend to be difficult to hear clearly in many movies.

Channel:

5.1 is the common name for six channel surround sound multichannel audio systems. 5.1 is now the most used layout in both commercial cinemas and home theaters. It uses five full bandwidth channels and one low-frequency effects channel.

Audio Return Channel

The Audio Return Channel (**ARC**) connects your TV and audio system with a single High Speed **HDMI®** cable and eliminates the need for an additional composite audio or optical cable.

Optical Audio:

Both HDMI and **optical** pass digital **audio** from one device to another. Both are **better** than analog (the red and white cables). Both can pass multi-channel **audio**, like Dolby Digital. Both cables can be had pretty cheap.

Microphones are generally of two types –

- Dynamic microphones
- Condenser microphones

A dynamic microphone is used to capture loud and strong sounds like drums and high vocals. Whereas the condenser microphone is used to record delicate & studio vocals.

AUDIO

https://www.intel.in/content/www/in/en/products/docs/chipsets/high-definition-audio.html

An important sound card characteristic is polyphony, which refers to its ability to process and output multiple independent voices or sounds simultaneously. These distinct channels are seen as the

number of audio outputs, which may correspond to a speaker configuration such as 2.0 (
(stereo and sub-woofer), 5.1 (surround), or another configuration.

Graphics Card

The graphics processing unit (GPU), also called graphics card or video card, is a specialized electronic circuit that accelerates the creation and rendering of images, video, and animations. It performs fast math calculations while freeing the CPU to perform other tasks.

UMA

UMA stands for unified memory architecture; It indirectly refers to the fact that integrated graphics card uses the system RAM because it does not have any of its own integrated RAM. Use the dedicated GPU for playing games.

Switchable Graphics

Switchable Graphics is a technology that utilizes both the graphical processing capabilities of a discrete graphics adapter and the power efficiency of an integrated graphics adapter.

Discrete/Dedicated Graphics

Discrete graphics is a GPU that is a separate from the processor. Discrete graphics has its own dedicated memory that is not shared with the CPU. Since discrete graphics is separate from the processor chip, it consumes more power and generates a significant amount of heat.

GDDR

GDDR, which is short for graphics double data rate, is a type of memory tailored for use with video cards. While it shares design similarities with the DDR SDRAM used as system memory, it is important to note that GDDR has several distinctions that make its performance much faster.

RAM is a memory device whereas Graphics card is like a CPU that can perform very fast calculations needed for Rendering Graphics at high speed.

AMD

- Radeon
- Radeon Pro

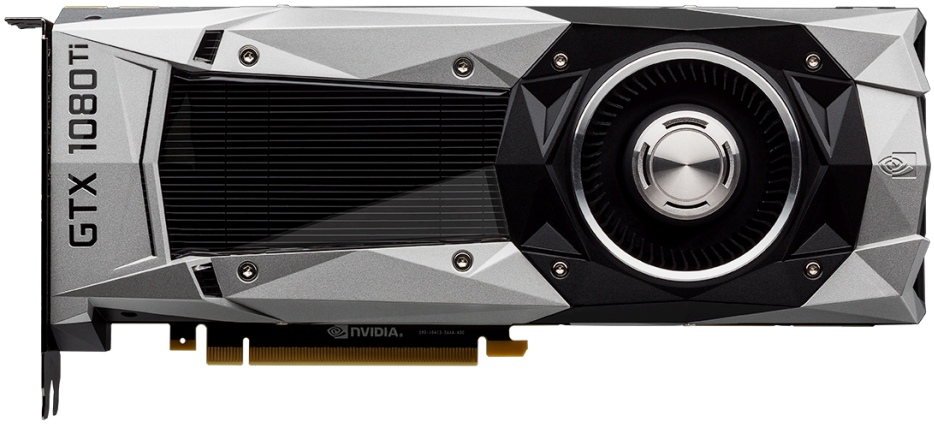
Radeon Pro is AMD's brand of professional oriented GPUs. It replaced AMD's FirePro brand in 2016

Professional Graphics Card

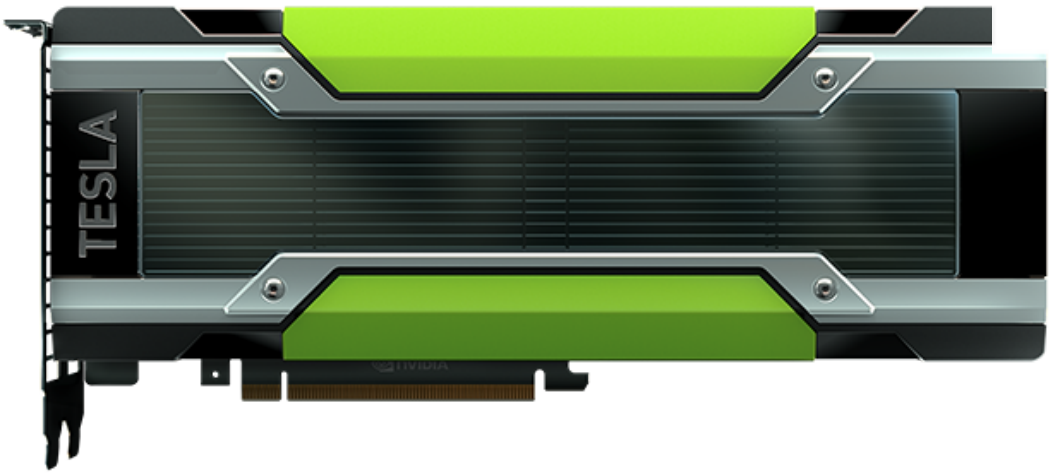
Module type	Chip type	Memory clock	Transfers/s	Transfer rate	
?	GDDR2	500 MHz	?	128 Gbit/s	16.0 GB/s
64 lanes	GDDR3	625 MHz	2.5 GT/s	159 Gbit/s	19.9 GB/s
64 lanes	GDDR4	275 MHz	2.2 GT/s	140.8 Gbit/s	17.6 GB/s
64 lanes	GDDR5	625–1000 MHz	5–8 GT/s	320–512 Gbit/s	40–64 GB/s
64 lanes	GDDR5X	625–875 MHz	10–12 GT/s	640–896 Gbit/s	80–112 GB/s
64 lanes	GDDR6	875–1000 MHz	14–16 GT/s	896–1024 Gbit/s	112–128 GB/s

NVIDIA

RTX and GTX and Tesla



-



RTX Cores

GeForce RTX graphics cards are powered by the Turing architecture, which includes support for new features and technologies that accelerate performance and make your games look even better.

NVIDIA RTX graphics cards are the first to include Ray Tracing Cores. This dedicated ray-tracing hardware can cast upwards of 10 giga rays per second, allowing real-time, movie-like lighting in games. Real-time ray tracing is only possible because RTX graphics cards deliver up to 6x faster ray-tracing performance

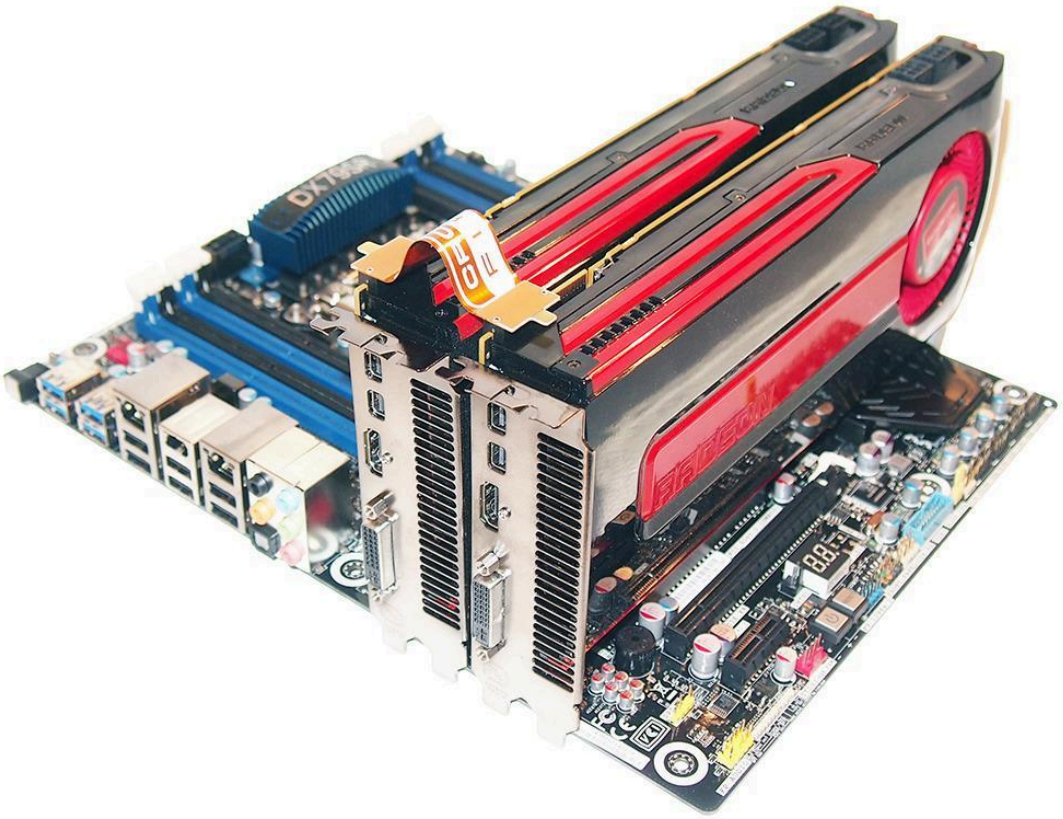
Quadro

Professional Graphics Card

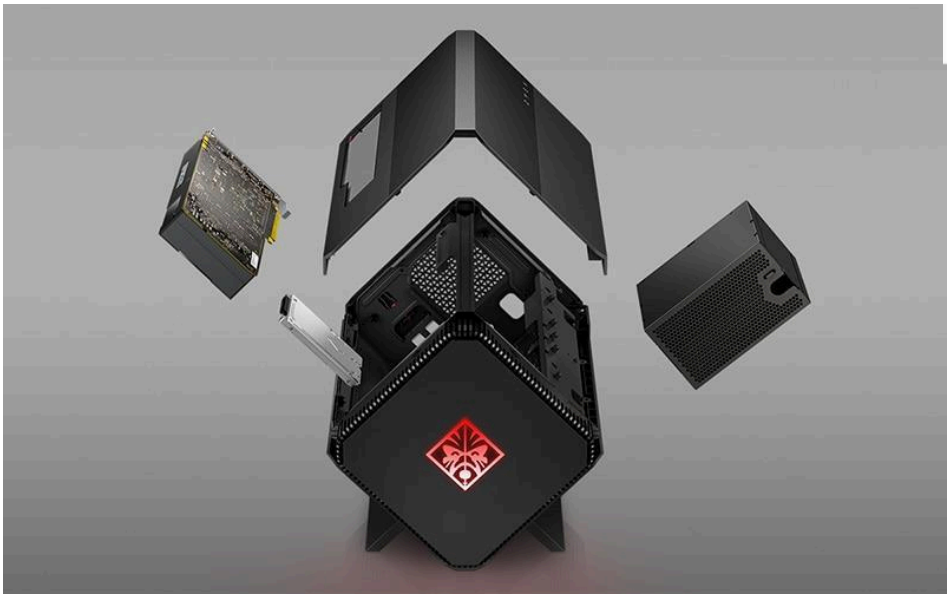
SLI and Crossfire

NVDIA SLI = Scalable Link Interface

Crossfire



https://www.hp.com/us-en/campaigns/omenaccelerator/overview.html



Shortcuts

ESC = Startup Menu

F1 = Help

F2 = UEFI Diagnostics

F9 = Boot options

F10 = BIOS Setup Utility

F11 = System Recovery

BIOS Simulator:

HP ProBook 450G6 Interactive BIOS Simulator
http://h10032.www1.hp.com/ctg/Manual/c06534544.pdf

HP EliteDesk 800 G5 DM 35W
http://h10032.www1.hp.com/ctg/Manual/c06527315.pdf

HP ZBook 17 G6 Mobile Workstation
http://h10032.www1.hp.com/ctg/Manual/c06535377.pdf

BIOS - POST

8-bit program = 16bit program

Right amount of Power
CPU
Memory (RAM)
Graphics card and the Display = HP Logo appearing on the screen
Keyboard

Trusted Platform Module

TPM (Trusted Platform Module) can also be called as secure crypto processor is a microcontroller through integrated cryptographic keys. that can securely store artifacts used to authenticate the platform (your PC or laptop). ... A TPM can also be used to store platform measurements that help ensure that the platform remains trustworthy.

Clearing the TPM can result in data loss. ... Clearing the TPM causes you to lose all created keys associated with the TPM, and data protected by those keys, such as a virtual smart card or a login PIN. Make sure that you have a backup and recovery method for any data that is protected or encrypted by the TPM.

Open Settings. Click on System.
Windows key + R keyboard shortcut.
Type tpm.msc.
Under the "Status" section, confirm "The TPM is ready for use" to confirm the device has a trusted platform module, and it's enabled.

UEFI
VERSUS
LEGACY BOOT

UEFI	LEGACY BOOT
A booting process in modern computers that provides advanced capabilities than BIOS	The process of booting the computer using the BIOS firmware
Uses URFI firmware that maintains a list of valid boot volumes known as EFI Service Partitions for the boot process	Uses the BIOS firmware for the boot process
Has additional security features and is more efficient	Not as efficient as UEFI
More user-friendly	Less user-friendly
Uses the GUID Partition Table (GPT)	Ues the Master Boot Record (MBR) partitioning scheme

UEFI
Unified Extensible Firmware Interface

Other Devices self-test programs is managed by UEFI 64bit program.
Real-time self-checks.

No Power
No POST
No Display
No Boot

CBR
Crisis BIOS Recovery

1. Make sure the PC is OFF
2. Press and Hold the Win+B and Power on the PC *
3. Will work only for an OEM OS PC.

CMOS Reset

1.Make sure the PC is OFF
2. Press and Hold the Win+V and Power on the PC*

OEM and non-OEM PC

An HP PC with a pre-installed Windows OS is called an OEM PC
An HP PC without pre-installed Windows OS is called a non-OEM PC or Free DOS PC

HP OEM OS PC:

C: OS and customer data
D: OS Recovery
E: HP Tools

When to do CBR and CMOS

1. If there is any life in the PC and the PC is not working.
2. CMOS Reset is supposed to be done alongside CBR.

CMOS = Complementary metal oxide semiconductor = Volatile memory.
CMOS chip power while the PC is off is provided by the CMOS battery.

Date and Time =
BIOS password =
Administrator password =
CMOS setup settings =

Legacy support enabled and secure boot disabled = to install a non-secure OS (Win7, 8, etc.).
Legacy supports Disable secure boot. Enable = Recommended way to install and use Windows 10.
For legacy support to install and utilize any operating system, disable secure boot.

Two types of parts

CSR = Customer self-Replaceable
FRU = Factory Removable unit

How to Identify the PC issues:

No Power:

1 – Dead PC.
2 – No Lights, No Display, No Fan Movement.

No POST:

1 – PC will Power On
2 – Categories
- a- PC will Show Blank Display, but no progress.
- b- PC will show HP Logo and stuck in the same screen.
- c- PC will Keep restarting post showing HP Logo.

No Boot:

1 – PC will Power On
2– PC will POST
3– Categories
- a. PC will Show HP Logo and then Blank Display, but no progress.
- b. PC will show Windows Logo and stuck in the same screen.
- c. PC will Keep restarting post showing Windows Logo.

No Display:

1 – PC will Power On
2 – But Nothing is happening in Display

Probing

Probing refers to inquiring closely into something.

Probing plays a very vital role,

- In understanding what the concern the customer is called in for.
- The concern can be supported by HP or Not (Warranty/Scope of support).
- If it can be supported, what correct troubleshooting steps need to be taken?

The below Four are the common probing questions that need to be asked in most of the HW issue scenarios, however depending on each issue the probing questions will vary and troubleshooting steps will also vary,

When - From When did this Issue started happening on the PC?
What - What HW/SW Changes were recently made in this PC?
Damages – Was there any kind of Accidental Damages /Liquid spillage happened in the PC?
Try to Replicate the issue.

NO POWER IN DESKTOP:

1. When = 3 days before
2. What = No HW/SW changes
3. Damages = No
4. The Power chord is connected to the Wall socket?
5. Is the Power chord connected to the PSU of the Tower?
6. Is Wall Socket Power available? And tested with any other Device?
7. Check if the unit is connected to a direct wall socket or through UPS?
8. Ask cx if he/she can swap the power cable
9. Check if the monitor is working fine
10. Do you see any Light Activity in the PC? (Power button light/Caps LOCK Light/system board Light)?
11. Have you seen any Fan Movement (PSU Fan/CPU Fan)?
12. Power Drain
13. CBR (WIN+ B+ power button)
14. CMOS Reset. (Win+ V+ power button)
15. Replace either SMPS or MBD.

NO POWER IN Notebook / AIO PC:

- **When**
- **What**
- **Damages**
- Is the Ac adapter connected to the Wall socket? /Any Docking station is used?
- Is the Ac adapter connected to the PC? /Adapter PIN is connected Firmly or any loose connection?
- Is Wall Socket Power available? And tested with any other Device?
- Different HP Ac adapter was tried?
- Do you see any Light activity near by the AC adapter Port of the PC (Amber/White colored Light)?
- Do you feel if the AC adapter is warm or not?
- Do you see any Light Activity in the PC? (Power button light/Caps LOCK Light)?
- Do you see/Feel any Fan Movement?
- Power drain
- CBR
- CMOS reset
- Replace the system board.

Desktop (No Display):

- When
- What
- Damages
- Is there any kind of display visible? Or it is Fully Blank?
- The Power chord of the PC is connected to the Wall socket?
- Is the Power chord of the Monitor connected to the Wall socket?
- The Display Cable (VGA/DP/HDMI, DVI) is connected to both the monitor and the PC firmly?
- Is that Monitor being an HP Monitor?
- Ask CX to connect an alternate working monitor if available.
- Did you do Monitor Stand Alone Test? Do you see the Display?
- Do you see any Light Activity in the PC? (Power button light/Caps LOCK Light/system board Light)?
- Do you see any Fan Movement (PSU Fan/CPU Fan)?
- Change the Display Cable
- Power Drain
- CBR
- CMOS Reset
- If Discrete Graphic card is shipped<< replace graphic card
- If no additional graphic card/ integrated graphic card<< replace MBD

Notebook /AIO (No Display):

- When
- What
- Damages
- Do you see any Light activity on the DC in Connector of the PC (Amber/White colored Light)?
- Do you see any Light Activity in the PC? (Power button light/Caps LOCK Light)?
- Does the PC show any Light activity if you press the CAPS Lock light?
- Have you connected an External Monitor /TV and checked the issue?
- If external display is working fine replace the laptop's display panel/ if same issue with external display perform next t/s.
- Power Drain
- CBR
- CMOS Reset
- Replace MBD

No POST: (PC will be stuck in HP Logo/Looping in HP Logo/ Post HP Logo stuck)

- When
- What
- Damages
- Do you see HP logo when the PC is powered ON? /PC Fan is Functioning?
- Do you see any Light activity on the CAPS LOCK light? Any Beep sounds/Blinking Lights?
- Do you see any Light activity on the Connector of the PC (Amber/White colored Light)?
- Have you connected an External Monitor and checked the issue?
- Power Drain
- CBR
- CMOS Reset
- Replace MBD.

Keyboard is not working:

- When
- What
- Damages / Any keys broken /fallen?
- Check if it is HP KB only
- All the Keys are not working? Or some keys are not working? If only some keys what are the keys?
- External / Secondary KB same keys is working or not?
- On screen KB (OSK) same keys is working or not?

Mouse issue:

- When
- What
- Damages

- Check if it is HP Mouse only
- Mouse is connected do you see lights glowing underneath the mouse? (not fo[illegible] mouse)
- Different Mouse is working
- If it is a Wireless Mouse – check by replacing fresh batteries.
- This mouse is not working in the other PC.

Touchpad issue:

- When
- What
- Damages
- Touchpad is On or OFF?
- Touchpad Pointer Erratic movement? Slow Movement? Not Responding?
- Touchpad Left side Top Corner Light is visible?
- External Mouse is working?

FAN is not working PC is overheating FAN is making Noise:

- When
- What
- Damages
- Do you feel fan is functioning in the base enclosure or in the Fan Vents? for a laptop
- *Do you feel fan is functioning in the side of the Desktop Tower?*
- Do you see any foreign particles stuck / the Cooling vents are Blocked in the Fan vents?
- PULSE Questions to be asked.
- Unit is malfunctioning because of this. (Error/Restarting/Overheating).
- BIOS Update /CBR.
- FAN UEFI diagnosis.

Battery Related Troubleshooting:

- When
- What
- Damages
- Battery is giving any error message. Or exclamation mark? 

- How long the battery can provide the charge? / How long it used to provide charge and the difference?
- Battery is Bulged?
- What are the usage requirements of the pc? Like software's? Games? Emails?
- Does the battery charge to 100%? Or till what percentage?
- Battery Diagnostics, BIOS Update.

Webcam:

- When
- What
- Damages
- Check if the Webcam has a Slider/Lock
- So, when the customer tries opening the Webcam again what message he is getting?

HP Performance Advisor.

Hardware related - Troubleshooting:

What are the Major Troubleshooting steps that you should know?

1 – Power Drain = Press and Hold the Power Button for 15seconds approximately.
2 – BIOS Factory Defaults = Apply Factory Defaults and EXIT.
3 – CBR = CRISIS BIOS Recovery.
4 – CMOS RESET.
5 – BIOS Update.
6 – UEFI Diagnostics.

HP Public Documents

1. How to Find HP PC Serial Number
   https://support.hp.com/us-en/document/ish_2039298-1862169-16

2. How to Enable/Disable Battery Ship Mode
   https://support.hp.com/us-en/document/c05369450

3. HP Battery Health manager
   https://support.hp.com/us-en/document/c06465959

   Battery Optimizer
   https://support.hp.com/us-en/document/c06310986

Battery Indicator Light

https://support.hp.com/us-en/document/c00287805


4. Where to Download HP UEFI Diagnostics / PC Diagnostics
   https://www.hp.com/us-en/campaigns/hpsupportassistant/pc-diags.html

5. How to do Power Reset/Power Drain
   https://support.hp.com/vn-en/product/hp-15-notebook-pc-series/10862300/document/c01684768

6. CBR without Flash Drive
   https://www.youtube.com/watch?v=qpiGUojtr3E

7. CBR using Flash Drive
   https://www.youtube.com/watch?v=zjAZ0DTX3aI

8. CBR / CMOS Reset
   https://support.hp.com/hr-en/document/c02693833

9. Desktop PC Beep or blink Codes:

   https://support.hp.com/us-en/document/ish_1997210-1528385-16

10. Notebook PC Beep and Blink Codes:

    https://support.hp.com/us-en/document/ish_1997719-1528356-16

11. PC starts with Blank screen:

    https://support.hp.com/in-en/document/c03518165

12. Notebook and AIO Display issues:
    https://support.hp.com/in-en/document/c01881110

    https://support.hp.com/in-en/document/c01608578

13. PC is slow:

    https://support.hp.com/us-en/document/c06102177

14. PC Fan is Noisy:

    https://support.hp.com/in-en/document/c01007591

15. Understanding Battery Warranties:

    https://support.hp.com/in-en/document/c05843717

16. Bit locker:

    https://support.hp.com/in-en/document/c06432394

17. UEFI Diagnostics
    https://support.hp.com/us-en/document/ish_2854458-2733239-16

18. BIOS Simulators

    Consumers:

    http://h10032.www1.hp.com/ctg/Manual/c06527752

    http://h10032.www1.hp.com/ctg/Manual/c06498459

    - No PDPB
    - Three R's

As per HP Warranty Terms and Conditions HP has defined LCD screen related issues in this document
The document is
https://support.hp.com/in-en/document/c01881110
https://support.hp.com/in-en/document/c01608578
As per that document the issue is not covered under HP Warranty terms and conditions for your PC

Power

1. Desktop PC is not powering on – TBS
2. Notebook PC/AIO/Mini Desktop PC is Not powering ON
3. How to do Second Level Power Drain or Bare Minimum in Desktop PC
4. Battery is giving less backup only how-to tbs.
5. Battery is Bulging how to tbs.
6. Plugged in not charging how to tbs
7. Battery is charging only till 80% how to tbs = Battery Health manager.
   https://support.hp.com/in-en/document/c06465959
8. AC adapter is overheating tbs?
9. SMART Ac adapter Error message tbs?
10. PC is restarting continuously after/before Showing HP Logo (No POST).
11. PC is Overheating – PULSE – PSIR - Thermal Event.

Blink Codes

12. Notebook/Desktop PC is Blinking 2/3/4/5 Major Blinks or Beeps.

Display

13. No Display in Desktop PC
14. No Display in AIO Desktop PC
15. No Display in Notebook PC
16. Display is Having vertical/ Horizontal Lines/ Half screen how to proceed in Desktop or Notebook PC?
17. Display is Blurred/ Blinking – Troubleshoot – Desktop PC/Notebook PC?
18. Display has no Backlight– Troubleshoot – Desktop or Notebook pc?
19. Display is having Dead Pixels for a monitor/Notebook how to Proceed?

POST

20. 3F0/301/ Short DST Warning Error/ SMART Imminent Failure Troubleshoot.
21. 601 Error Troubleshoot
22. 90B Error Troubleshoot

----------THE END ----------