

Easy Technical Guide to Understand PC Motherboard, Troubleshoot Problems and Its Repair: PART – III

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Abstract : The myriad advances in information technology and use of automation in each and every field, the information systems turning out to be more pervasive. Thus, automating computer fault diagnosis is becoming so fundamental that soon every enterprise has to accept it. The first and second part of this paper series discussed the details and troubleshooting of different VRM circuits and Input / Output controller block of integrated motherboard. In the third part of this paper series details of North bridge chipset and South bridge chipset is discussed. Also to identify, test and diagnose these sections with its possible remedies are described.

Keywords: Computer, Motherboard, North bridge chipset, South bridge chipset, stabilizer circuits.

I. INTRODUCTION

In the fast growing era of technology and science and the utmost importance of automation in this digital world, the widespread use of computers is indispensable in almost all sectors.

Computers help us with calculations, storing data, staying organized and also entertain and inform us.

They add speed and accuracy in performing various functions. Thus they help us save time and money. Computers have made major implications in various fields which includes Science, Education, Medical, Technology, Business, Agriculture and lot more. Computer is highly reliable scientific equipment. With the help of internet on computers we stay connected with our friends and family. People can find entertainment through Internet.

Computers have revolutionized the world as they have changed the way many things are done.

The use of computers today holds a lot of importance in every sphere of human life.

Even with more updated software and Hardware, occasionally computers can malfunction. In order to solve a problem, we must figure out which part of the system is not working properly or damaged.

In the first part of this paper series different VRM circuits of integrated Motherboard, the fault finding and its remedies was described [1].

The Second part of this paper series covered details of Input / Output controller block, troubleshoot guide and testing of various sections of this block[2]. The third part of this paper series covers details of North bridge chipset and South bridge chipset. It also includes the fault finding & identify problems with its repair solutions.

The detail block diagram of integrated Motherboard is as shown in Fig.1

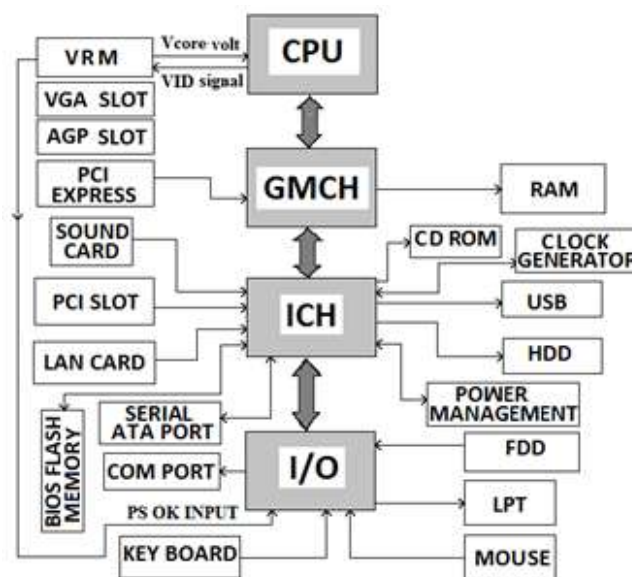


Fig.1 Block Diagram of Integrated Motherboard

II. DETAILS OF NORTH BRIDGE CHIPSET(GMCH) & SOUTH BRIDGE CHIPSET (ICH)

North bridge chipset is used to control high speed devices like CPU, RAM and Video card. This chip set controls the BUS speed and switches controlled data ensuring that data between the components is smooth and continuous. Also, it controls the speed of CPU and RAM. This type of chipset controls the switches so that each data stream passes in a fixed period of time like a traffic light.

The function of the south bridge chipset is to control the driver components like Sound card, Network card, Hard drive, CD-ROM drive, USB port, BIOS IC and Serial I/O. The general diagram of voltage stability requirement for both the chipset [3] is as shown in Fig.2

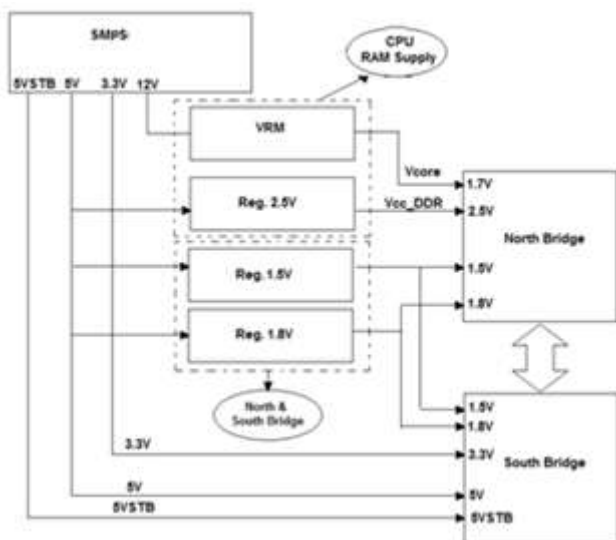


Fig.2 Block diagram of stabilized voltage for chipset

The North Chipset uses four different VCC voltage viz.(1.5V,1.8V,1.7V & 2.5V). Out of which two are common with South chipset voltage and other two are common for CPU and RAM.

The South chipset is having total five supply lines. Two chipset voltage (1.5V and 1.8V) are common with North chipset. The remaining three voltages viz. 5VSTB, 5V and 3.3V are obtained directly from ATX source.

The logic circuit diagram of normal chipset voltage stabilizer using oscillation driver IC is as shown in Fig.3.

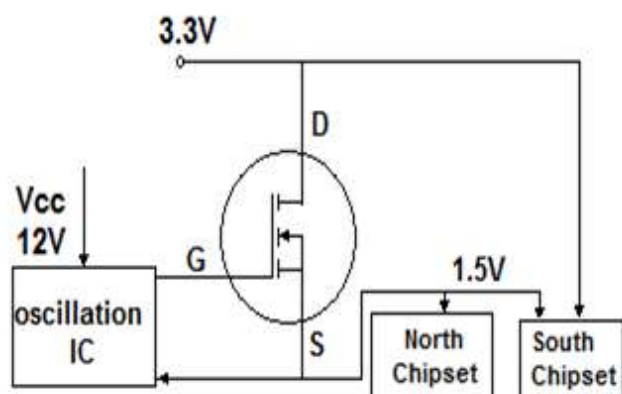


Fig.3 Circuit diagram of normal chipset voltage stabilizer using oscillation driver IC

When a supply is given, the IC will generate drive control voltage for Gate of MOSFET. Then MOSFET will supply 1.5V for load i.e. used for both chipset. However, there are various voltage stabilizer circuits available.

III. RAM POWER SUPPLY

For different types of RAM the required voltages which are normally used [4] is as shown in Table 1.

Table : 1 Type of the RAM with required voltage.

Sr. No.	RAM TYPE	VOLTAGE
1	SDRAM	3.3V
2	DDR	2.5V
3	DDR2	1.8V
4	DDR3	1.5V

SDRAM operates with 3.3V which is already available on motherboard. It does not require voltage stabilizer circuit. For DDR slot 2.5V supply is used. DDR slot is having total 184 pins which is divided in two zones. Left zone consists of total 52 pins where as right zone is having total 40 pins. DDR2 slot consists of total 240 pins which requires 1.8V.

DDR3 slot is also having 240 pins but required voltage is 1.5V.

The Fig.4 Shows the circuit diagram of Voltage stabilizer [5] for RAM.

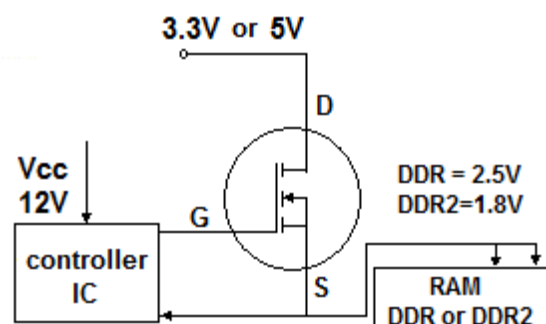


Fig.4 Circuit diagram of RAM Supply

Normally, Near RAM slot, stable voltage controller IC and POWER MOSFET are connected. The working of this circuit is same as circuit of chipset voltage.

IV. TROUBLE SHOOTING CHIPSET AND ITS REMEDIES

1. Voltage stabilizer circuit of chipset is not working.
i.e 1.5V & 1.8V supply is not available at chipset. Due to this motherboard will not boot.

No information is available on the screen. No beep sound. But Fan is on due to 5V given by STB.

- Check that Main card Test RST Lamp is off or not.
- If MOSFET is short : On the chip set 3.3V or 5V is available. Due to this chipset is heated.

2. Chipset power supply source MOSFET voltage stabilizer not working.

- Normally 3.3V is available on power MOSFET (Pin D) check this voltage.
- Power MOSFET (Pin S) of voltage stabilizer circuit 1.5V DC (with Intel) or 3V DC (for VIA chipset) available.
- Check these voltages.

3. South Chipset is damaged.

- Chipset – line source or 5V, 3.3V short.
 - When signal from the chipset does not reset the system.
 - South chipset is heating continuously before power is switched ON or after power is switched ON. This may be because chipset is short.
 - Replace Chip set.
- During normal operation the temperature of the chip set is around 40°C.

4. When South chipset does not give reset signal.

- Motherboard is dead.
 - North chipset CPU will not work.
 - Motherboard is not booted. Display is not available.
- With the help of Test card check the reset signal.
- Reasons for NO reset signal.
 - Chipset is not getting power.
 - South chipset Pin: Dry solder or Broken
 - Chipset Damage:
 - Due to SMPS source, chip set may fail to work.
 - Failures of South chipset driver components like Extension card of PCI slot, Driver of IDE slot, Sound card at USB port damage South chipset. Check power supply, dry solder, driver components of south chipset.

V. TROUBLESHOOTING RAM

1. Power at RAM is not available.

While during booting RAM power is not there, continuous sound of long beep error. Computer screen is blank. NO information seen on screen.

2. When RAM power is having loose contact. Again booting is not proper.

Check for proper RAM supply.

VI. CONCLUSION

The details of North Chipset (GMCH) & South Chipset(ICH) are provided. The voltage stabilizer circuit for this chipsets is presented. Possible reasons for failure of these sections are discussed. Diagnostic roots are described. Also the block diagram of power supply used for RAM is elaborated. Possible faults and its causes related to memory are discussed. Suggetions to solve the problems are made.

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