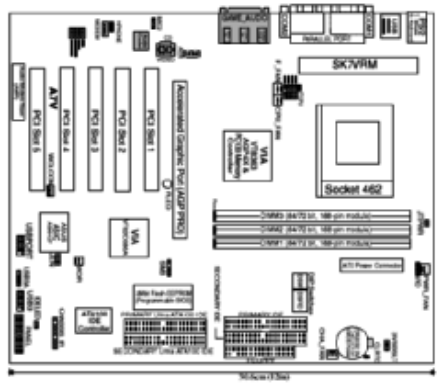
# Laboratório de Hardware - Placa-Mãe (estrutura) -

Prof. Renato Luiz Cardoso

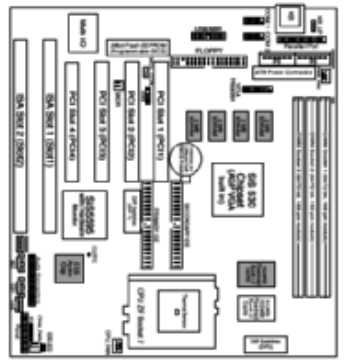
# Placas

- A maioria das placas de CPU modernas utiliza o padrão ATX. Existem ainda muitos modelos que usam os chamados Micro ATX e Flex ATX.
- Tratam-se de placas com características técnicas similares às do padrão ATX, porém com dimensões menores. Finalmente, encontramos ainda alguns poucos modelos novos no padrão AT.
- Para quem vai fazer manutenção e instalações em um PC um pouco antigo (anterior a 1999), existe a grande chance de que a placa de CPU encontrada seja do tipo AT.

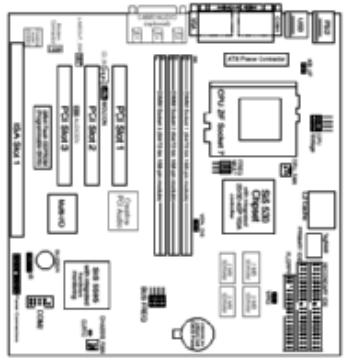
# Placas



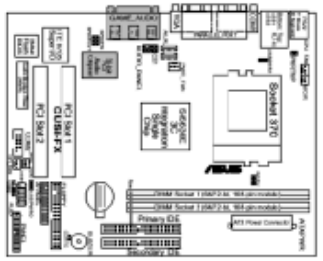

ATX



AT

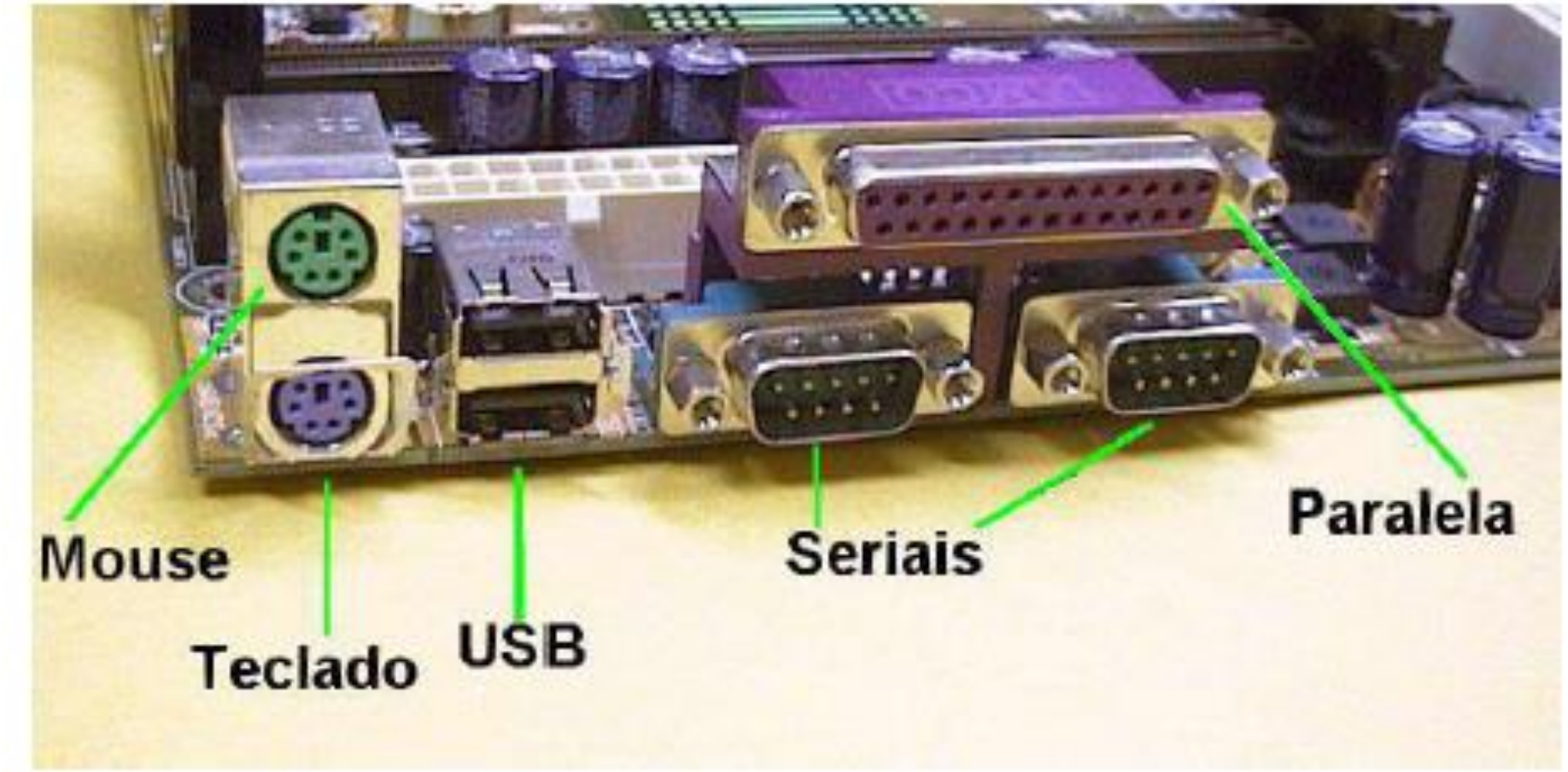


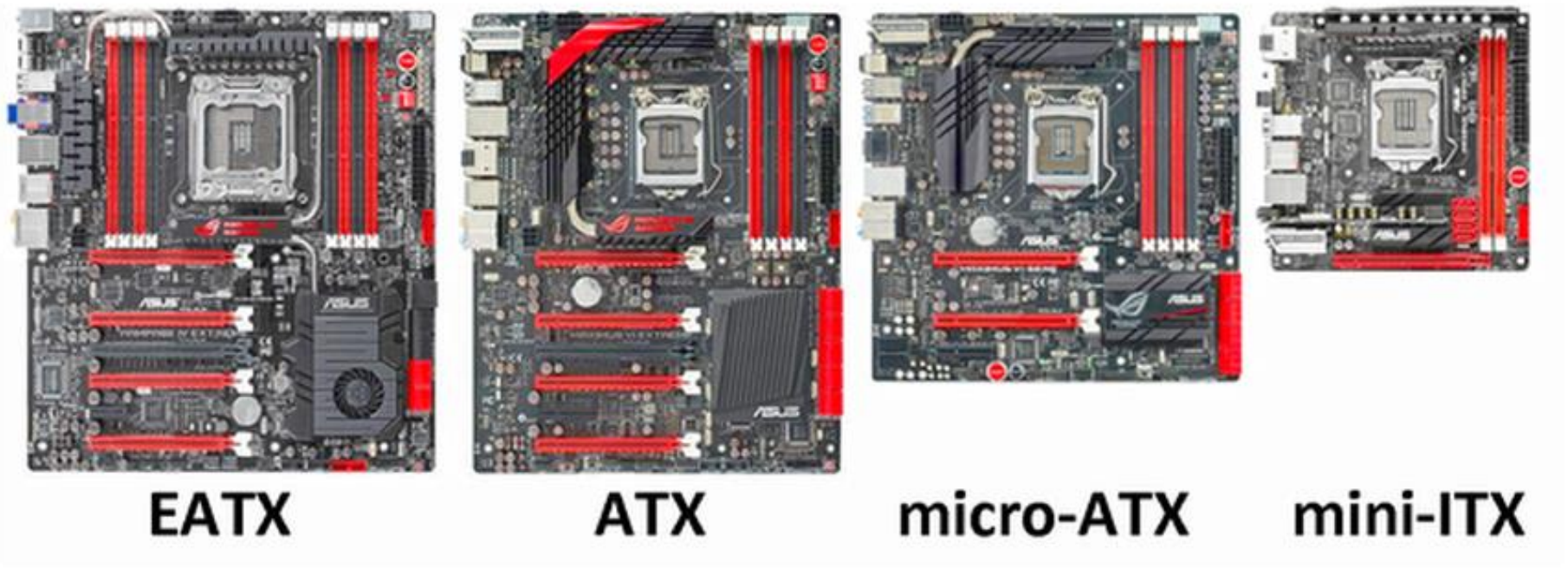
Micro ATX



Flex ATX

# Bloco de Conectores de uma placa ATX



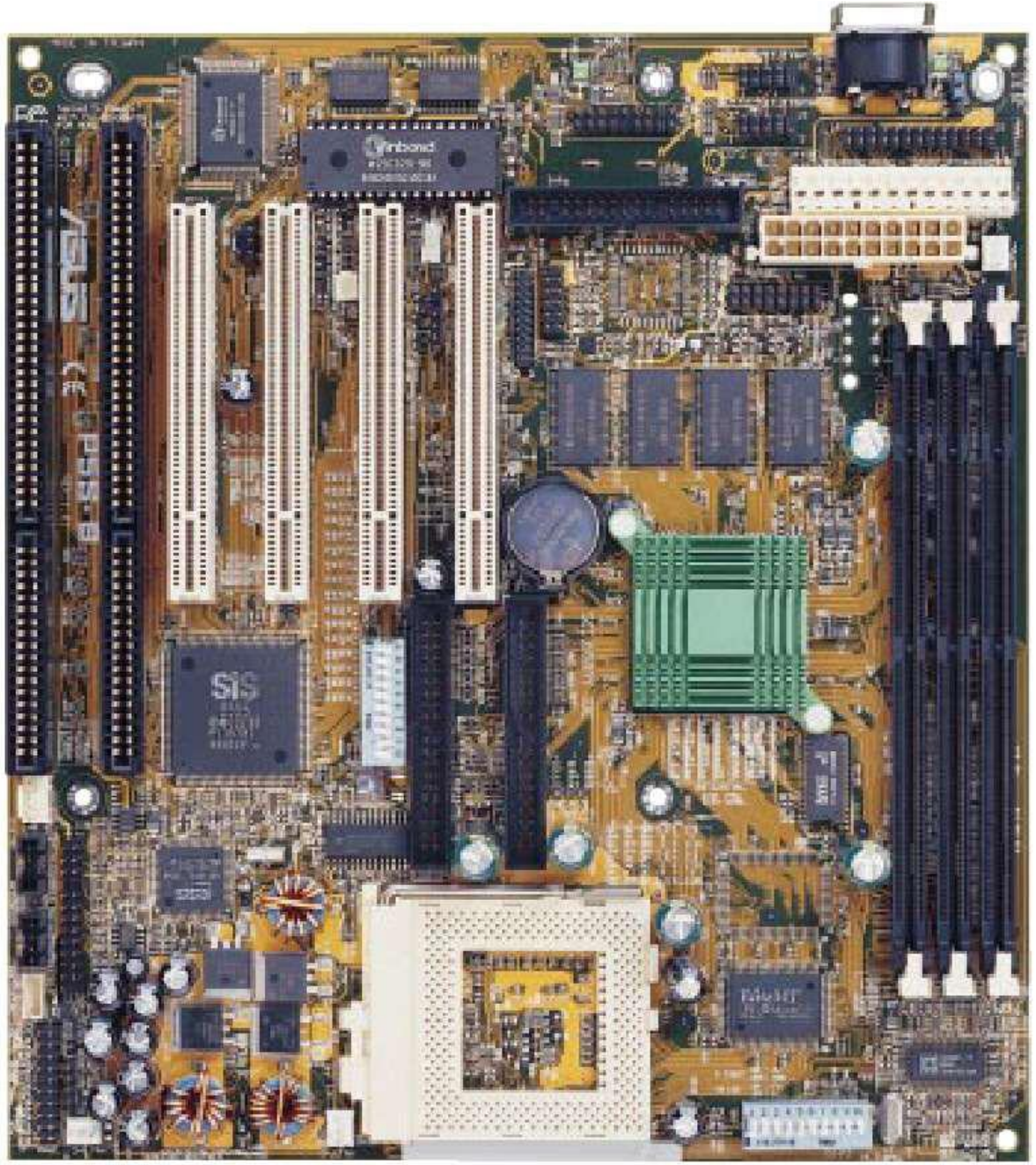



# Formatos

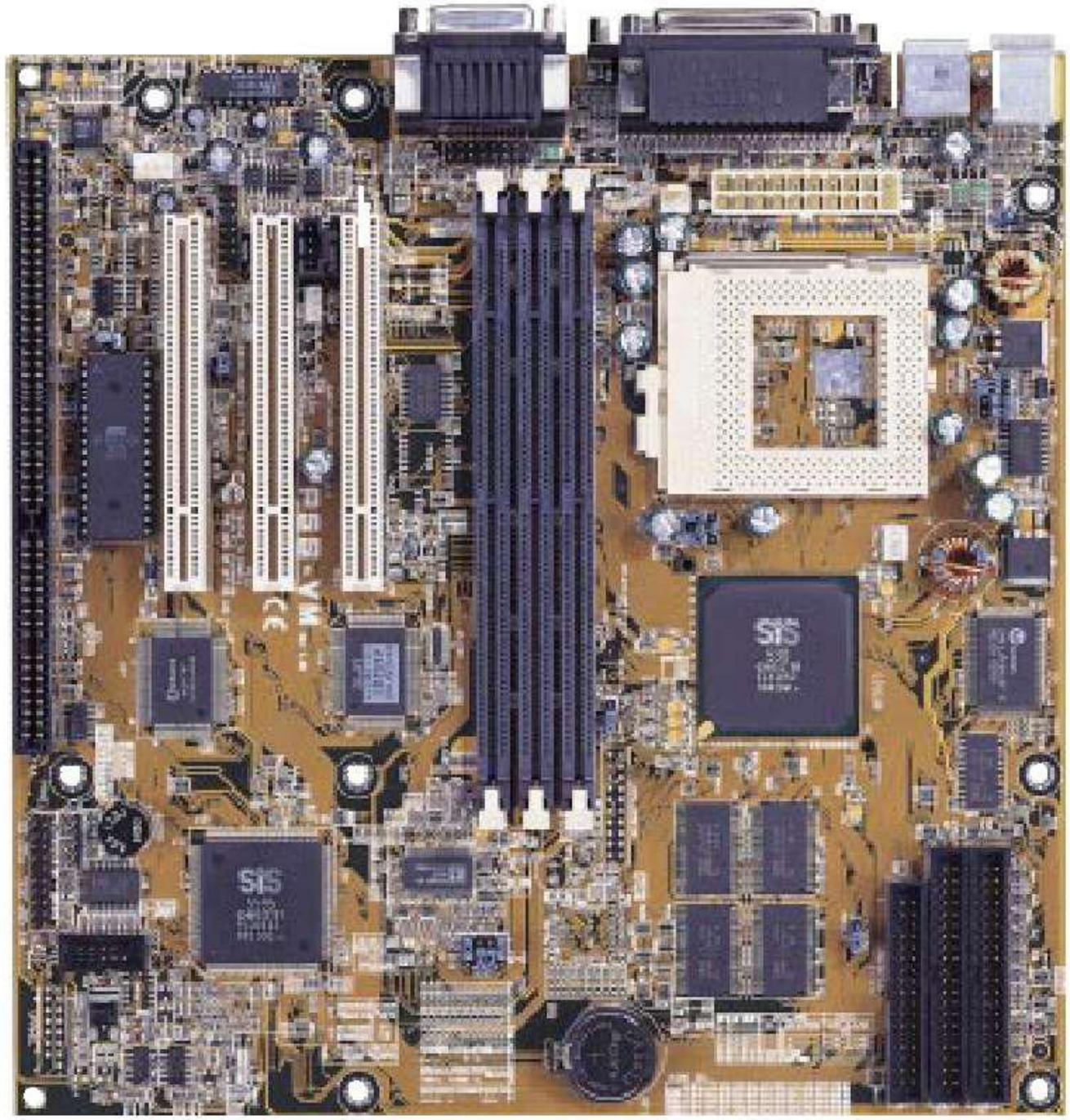
# ATX


SATA 6Gb/s
Fan Xpert
ASUS
H81M-C
USB 3.0 Boost
Network iControl

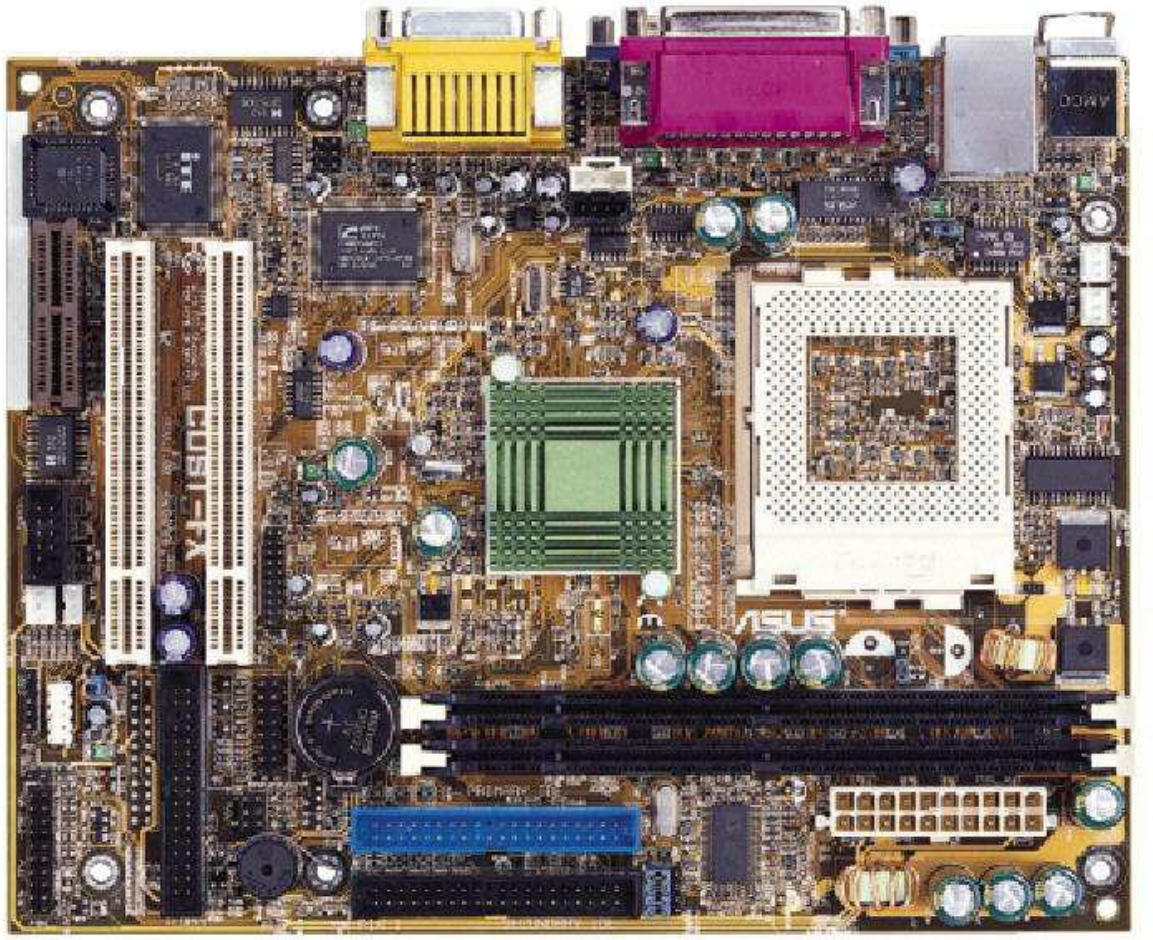
# AT BABY



# Micro ATX



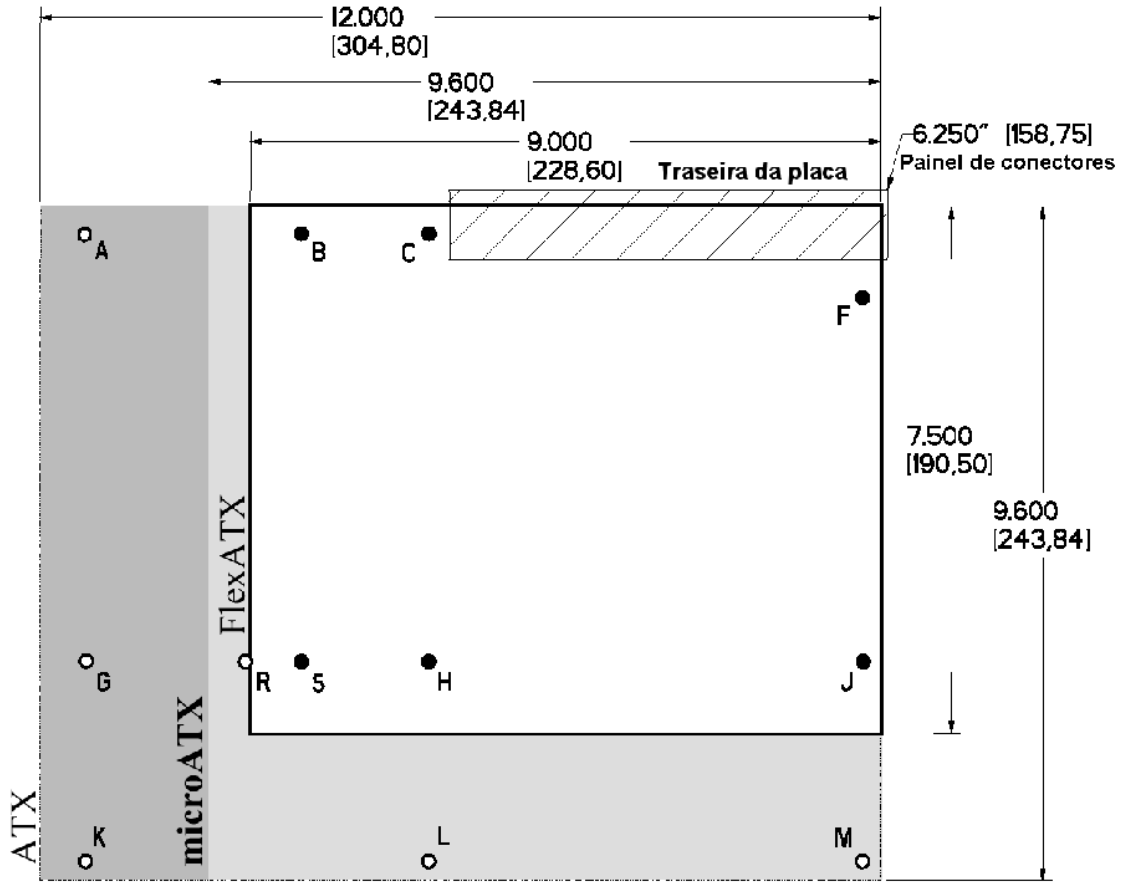
# Flex ATX



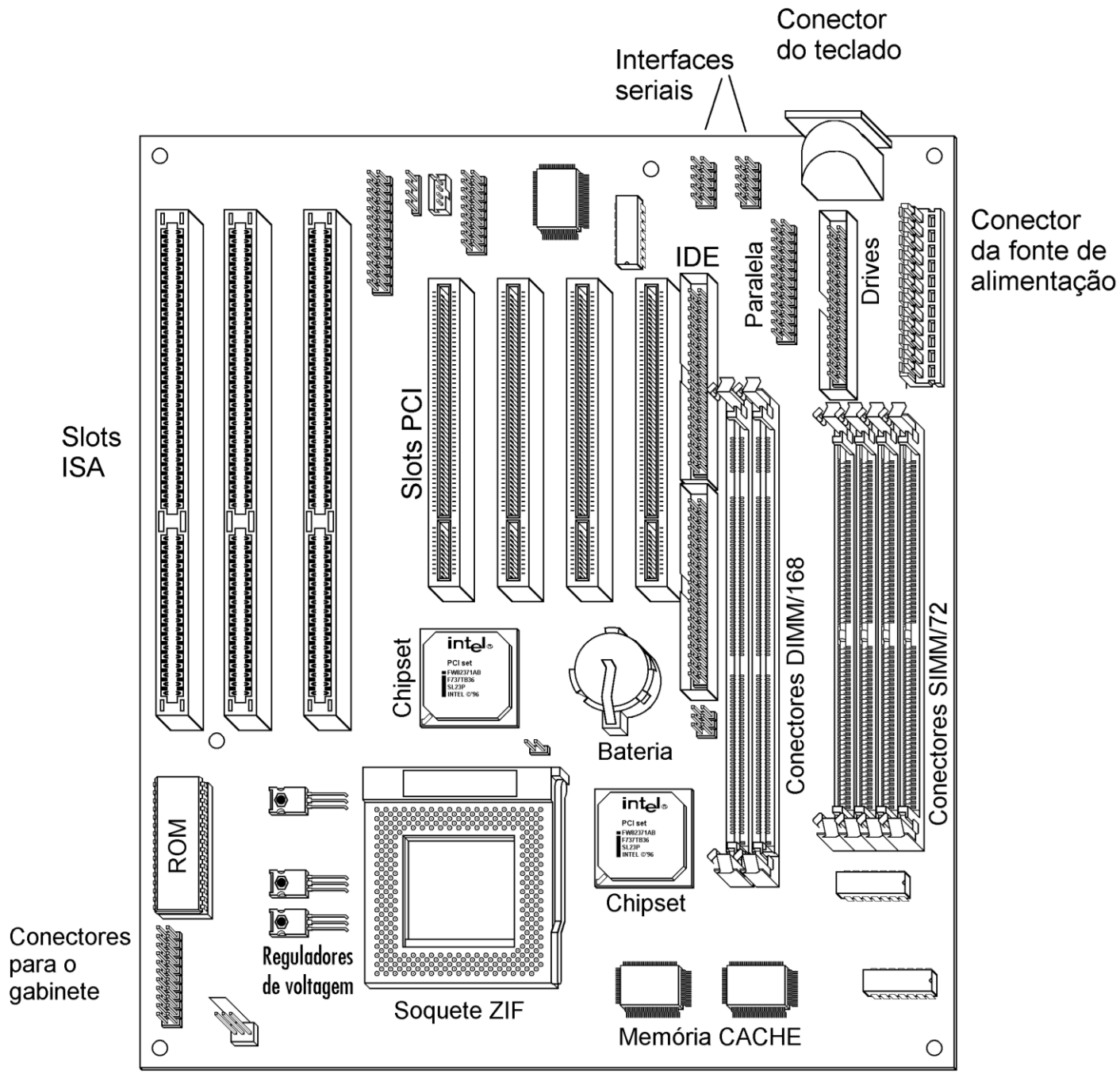
# Tamanhos

| Formato | Largura máxima | Comprimento máximo |
|---|---|---|
| Full AT | 12” (305 mm) | 13” (330 mm) |
| Baby AT | 8,5” (216 mm) | 13” (330 mm) |
| Full ATX | 12” (305 mm) | 9,6” (244 mm) |
| Mini-ATX | 11,2” (288 mm) | 8,2” (208 mm) |
| Micro ATX | 9,6” (244 mm) | 9,6”(244 mm) |
| Flex ATX | 9” (229 mm) | 7,5” (191 mm) |

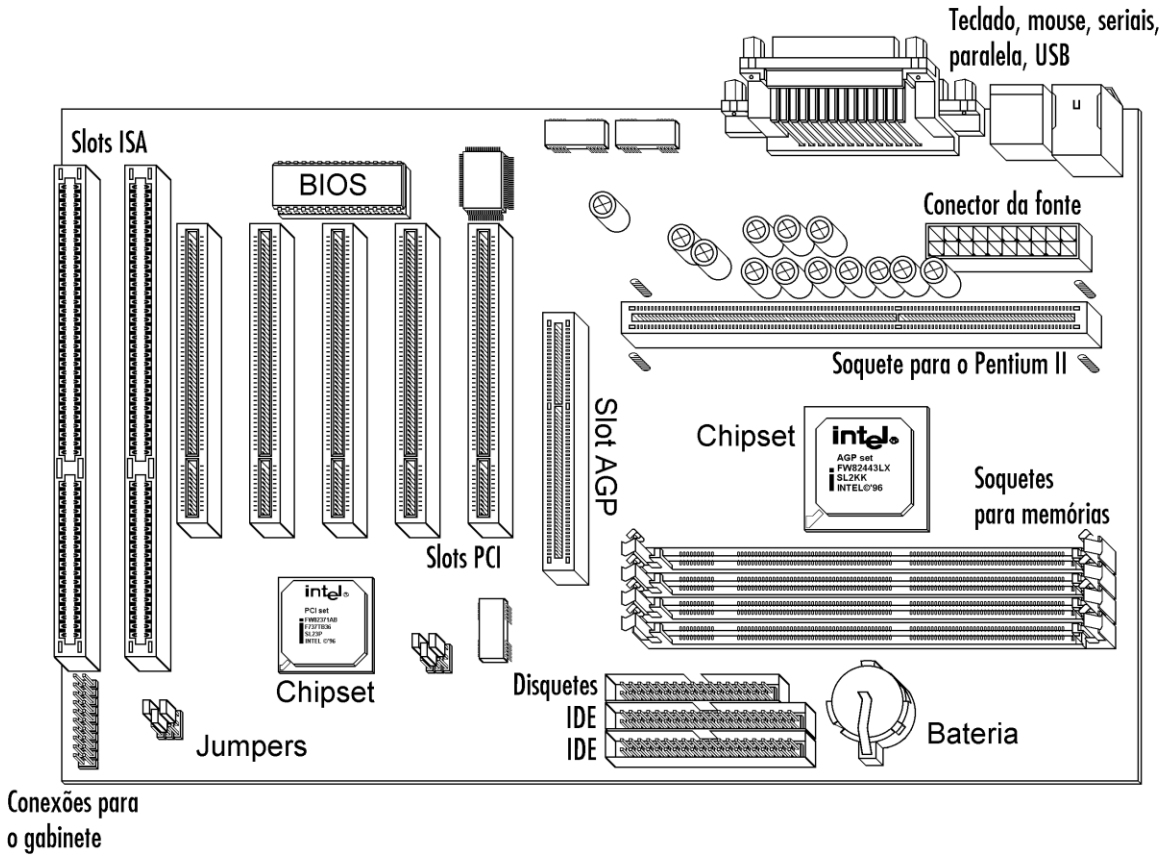
# Tamanhos

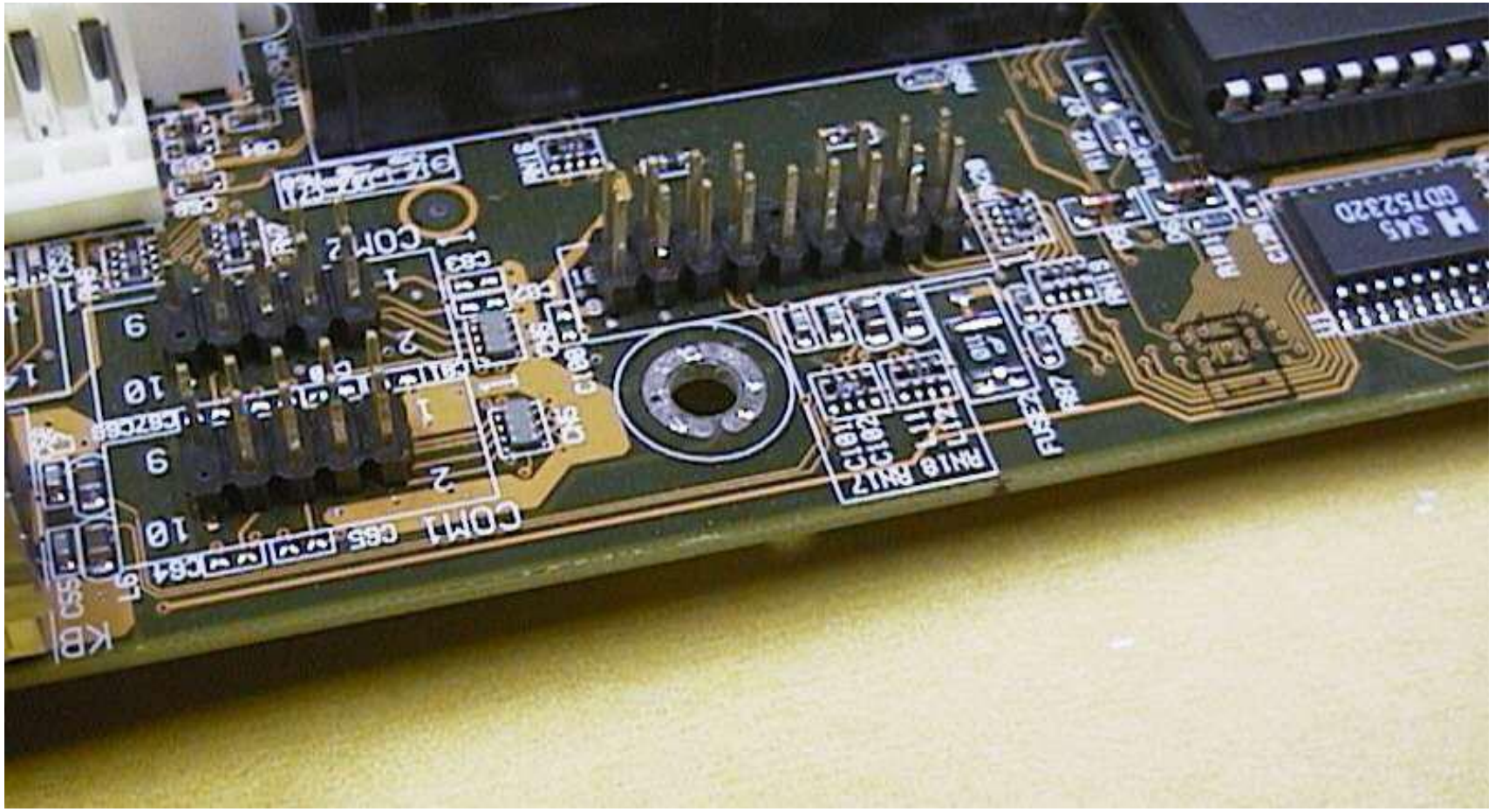

12.000
[304,80]
9.600
[243,84]
9.000
[228,60]
Traseira da placa
6.250" [158,75]
Painel de conectores
A
B
C
F
7.500
[190,50]
9.600
[243,84]
FlexATX
G
R
5
H
J
microATX
ATX
K
L
M

# Placa AT – Disposição dos Componentes



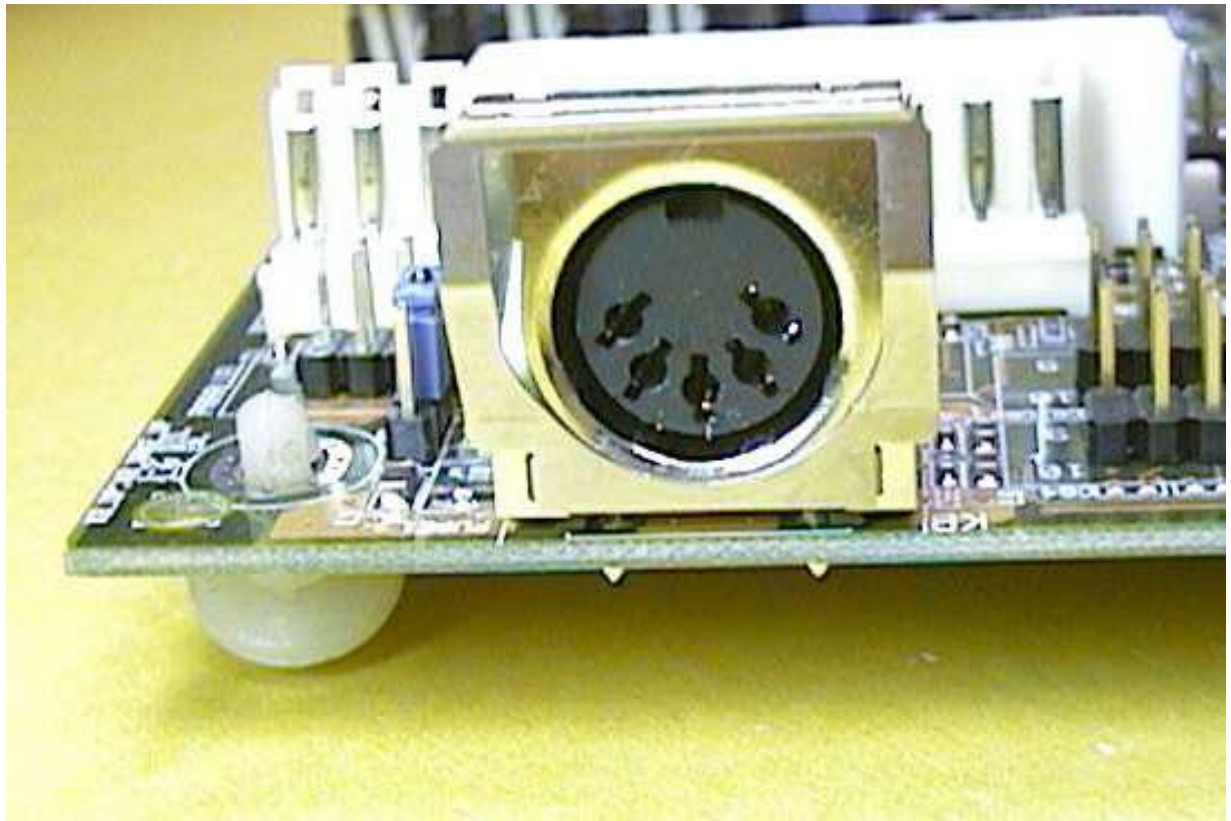
# Modelo ATX


Teclado, mouse, seriais,
paralela, USB
Slots ISA
BIOS
Conector da fonte
Soquete para o Pentium II
Slot AGP
Chipset
Soquetes
para memórias
Slots PCI
Chipset
Disquetes
IDE
IDE
Bateria
Jumpers
Conexões para
o gabinete



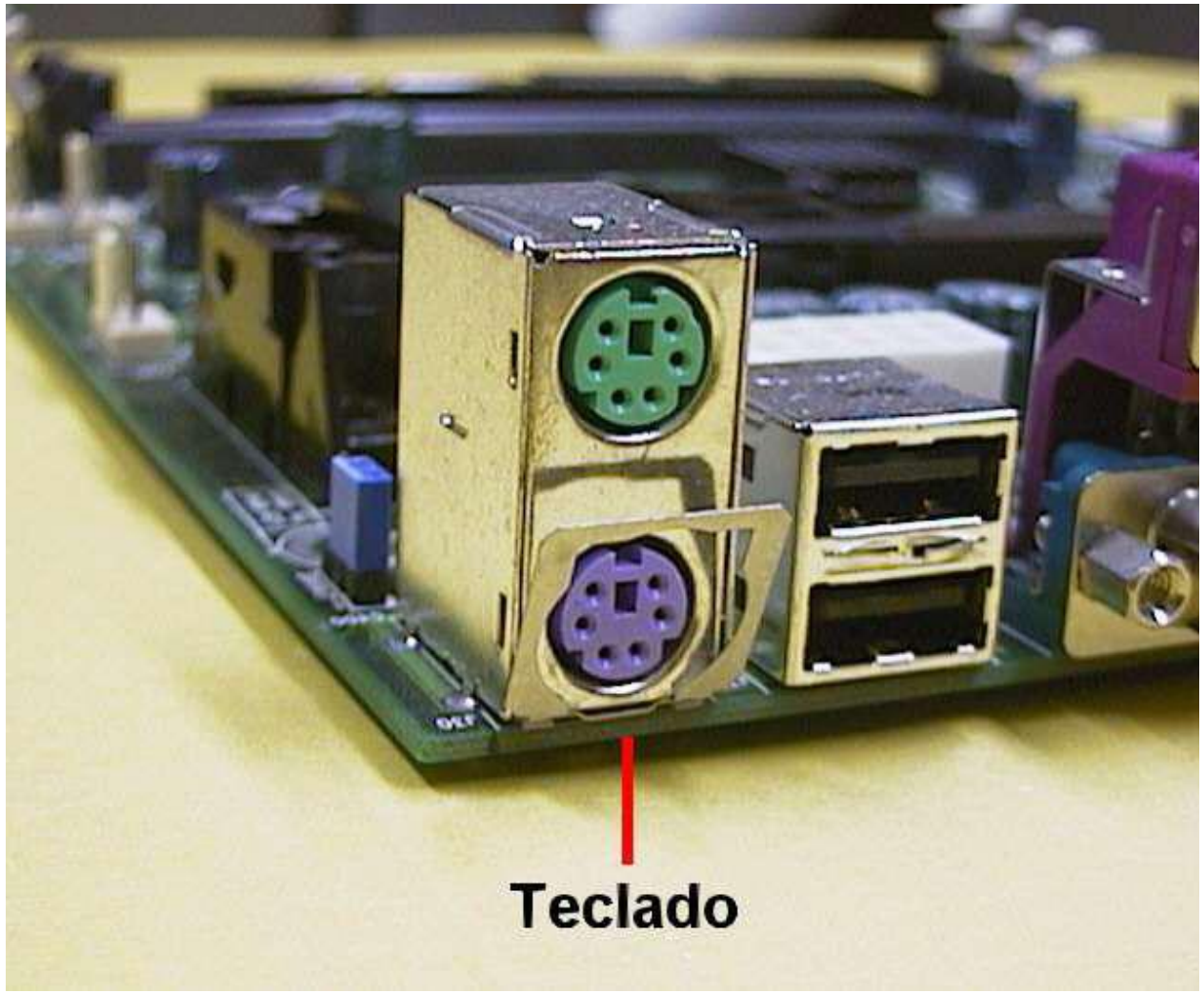

# Furos de Fixação

# Conector do Teclado (DIN 5)



# Conector e Adaptador DIN

# Conector PS/2



# Pinos do conector


Conector DIN de 5 pinos
fêmea, localizado na
placa de CPU

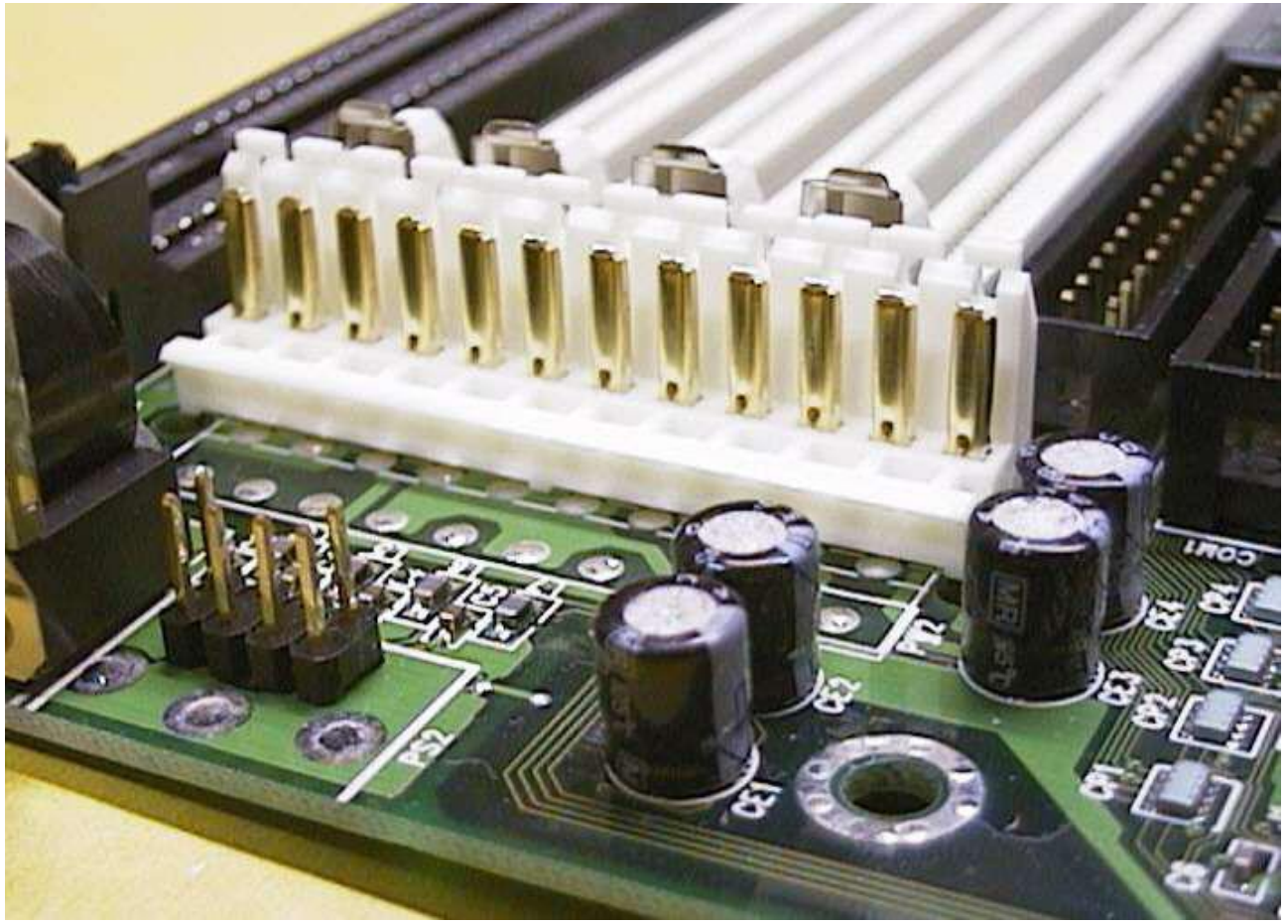

Conector DIN de 6 pinos
(padrão PS/2)
fêmea, localizado na
placa de CPU

| Pino | Sinal | Função |
|---|---|---|
| 1 | CLK | Clock |
| 2 | Data | Dados |
| 3 | N/C | Não conectado |
| 4 | GND | Terra |
| 5 | VCC | Alimentação +5V |

| Pino | Sinal | Função |
|---|---|---|
| 1 | Data | Dados |
| 2 | N/C | Não conectado |
| 3 | GND | Terra |
| 4 | VCC | Alimentação +5V |
| 5 | CLK | Clock |
| 6 | N/C | Não conectado |

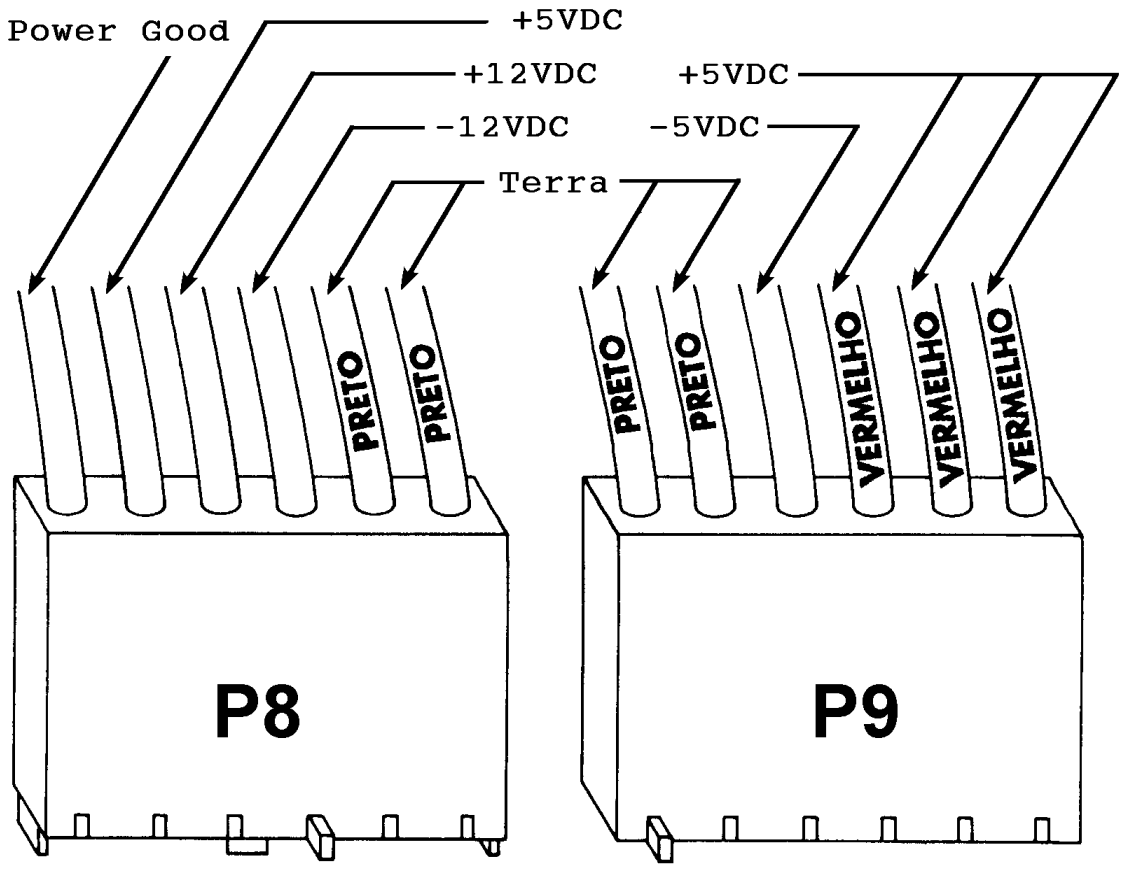
# Defeitos comuns?

- Falha na voltagem do conector
  - Normalmente ocasionada por falha de contato ou falha na solda. Solução: Refazer os pontos de solda do conector.
  - Conector espanado. Ocasionado por tentativa de encaixe errada. Solução: Trocar o conector.



# Conector de Alimentação AT

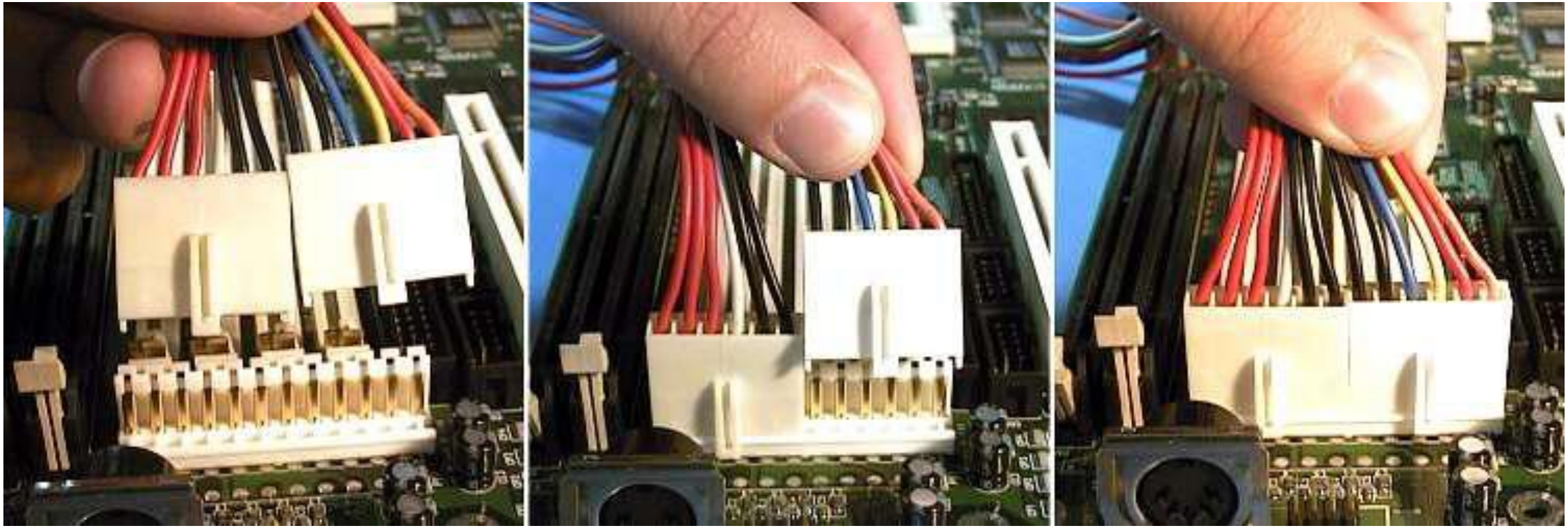
# Pinos do Conector de Alimentação AT



# Pinos dos Conectores

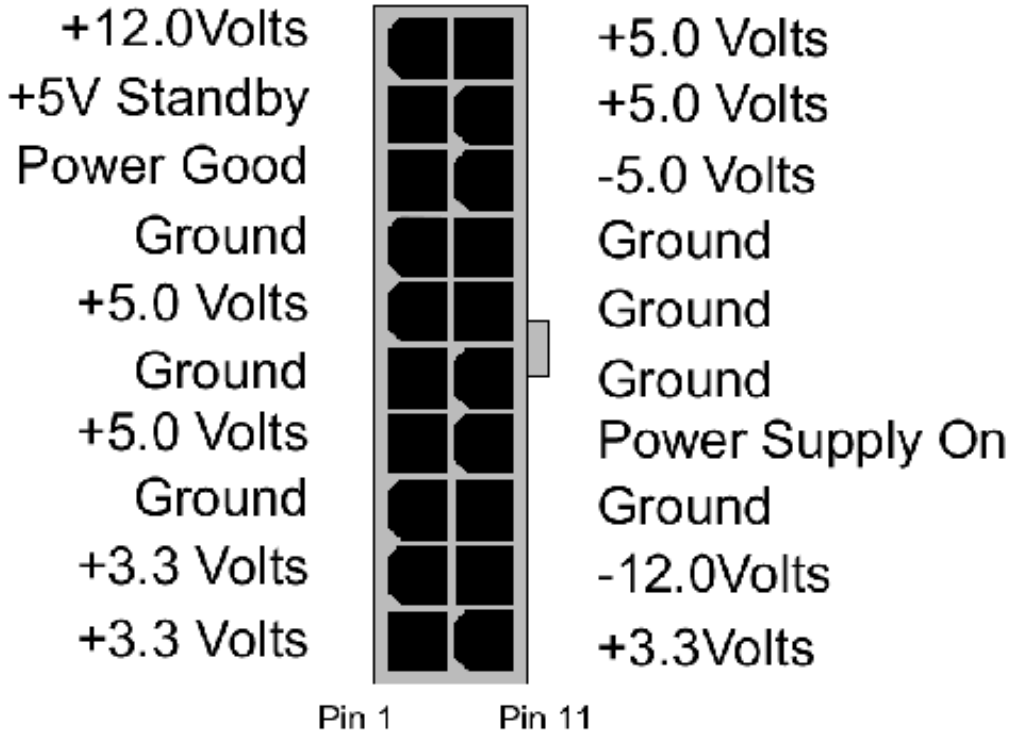
| Pino | Cor | Tensão |
|---|---|---|
| 1 | Laranja | Power Good (+5V) |
| 2 | Vermelho | +5V |
| 3 | Amarelo | +12V |
| 4 | Azul | -12V |
| 5 | Preto | GND |
| 6 | Preto | GND |
| 7 | Preto | GND |
| 8 | Preto | GND |
| 9 | Branco | -5V |
| 10 | Vermelho | +5V |
| 11 | Vermelho | +5V |
| 12 | Vermelho | +5V |

# Ligando corretamente a fonte AT

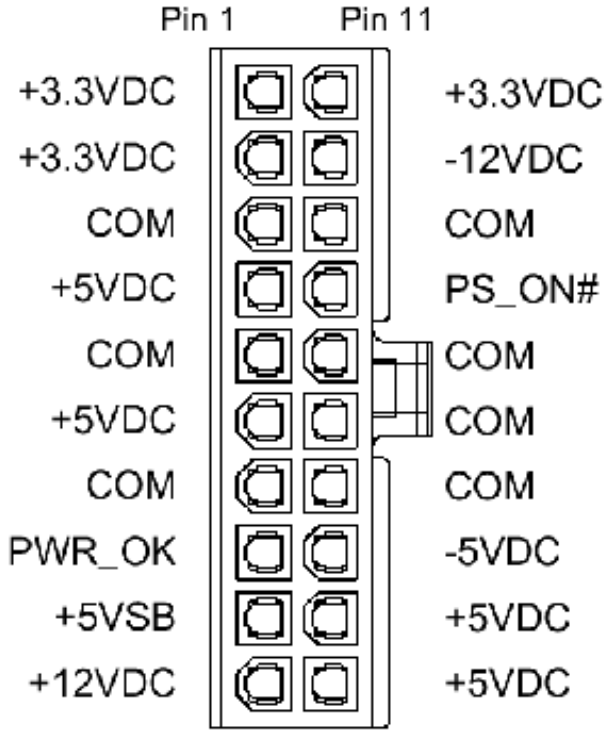


# Conector ATX

# Pinos de conexão ATX




**Na placa**

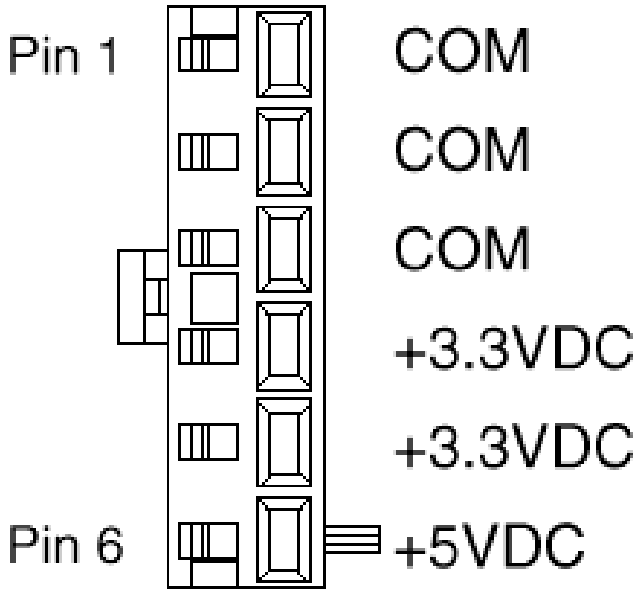



**Na fonte**

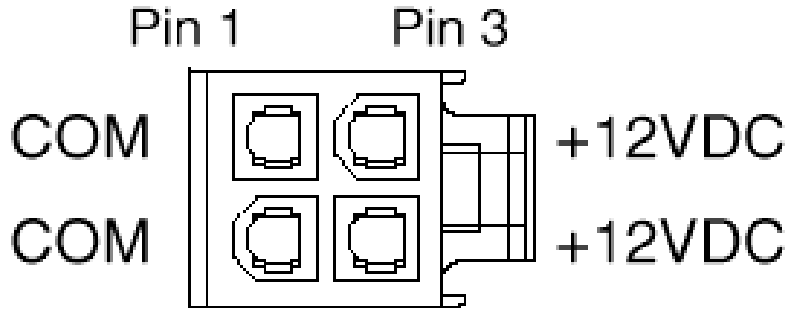
# Cores da conexão ATX

| Pino | Sinal | Cor | Pino | Sinal | Cor |
|---|---|---|---|---|---|
| 1 | +3.3VDC | Laranja | 11<br>[11] | +3.3VDC<br>[+3.3 V sense] | Laranja<br>[Marrom] |
| 2 | +3.3VDC | Laranja | 12 | -12VDC | Azul |
| 3 | COM | Preto | 13 | COM | Preto |
| 4 | +5VDC | Vermelho | 14 | PS_ON# | Verde |
| 5 | COM | Preto | 15 | COM | Preto |
| 6 | +5VDC | Vermelho | 16 | COM | Preto |
| 7 | COM | Preto | 17 | COM | Preto |
| 8 | PWR_OK | Cinza | 18 | -5VDC | Branco |
| 9 | +5VSB | Roxo | 19 | +5VDC | Vermelho |
| 10 | +12VDC | Amarelo | 20 | +5VDC | Vermelho |

# Conectores Adicionais da ATX

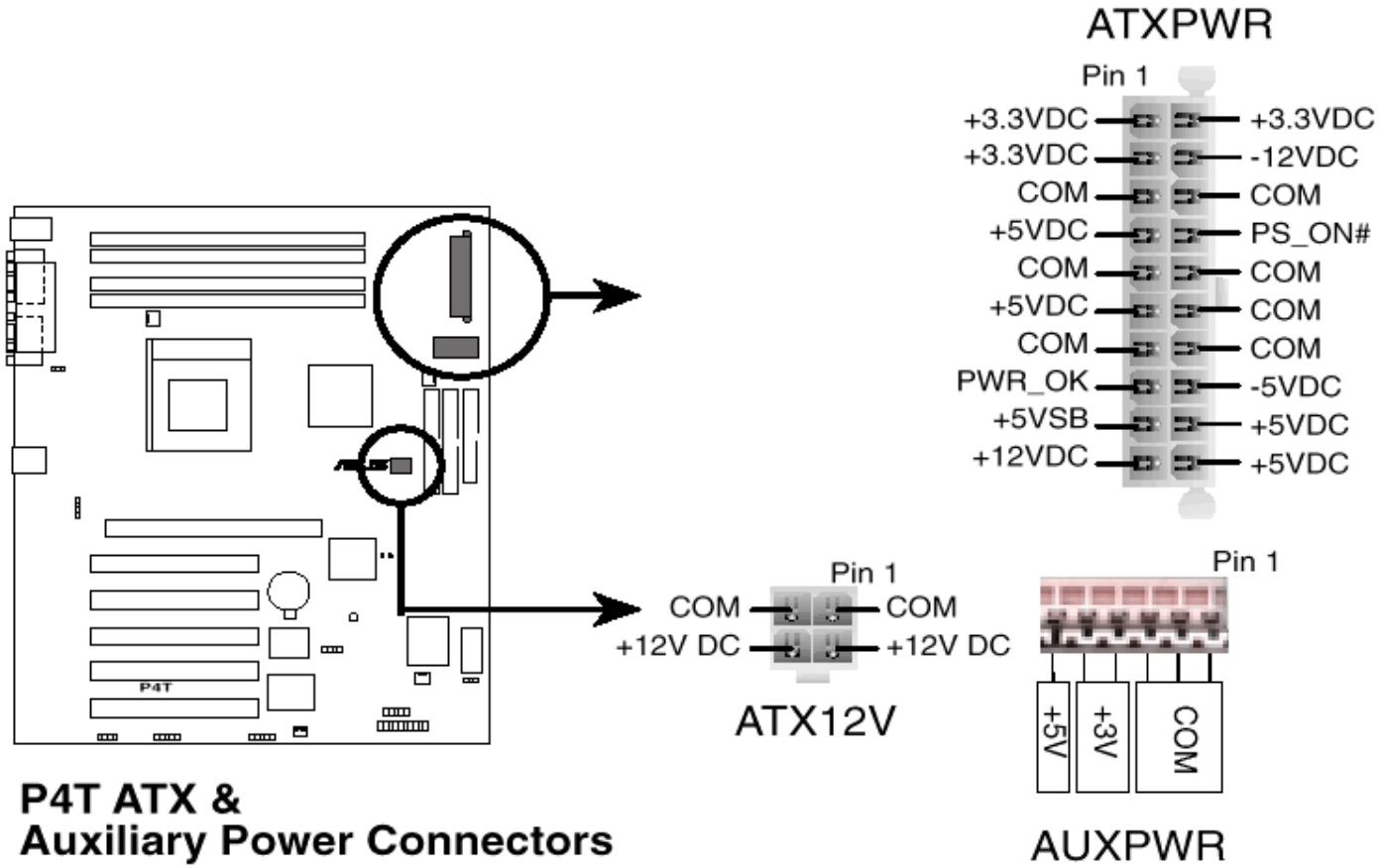



Aux Power Connector

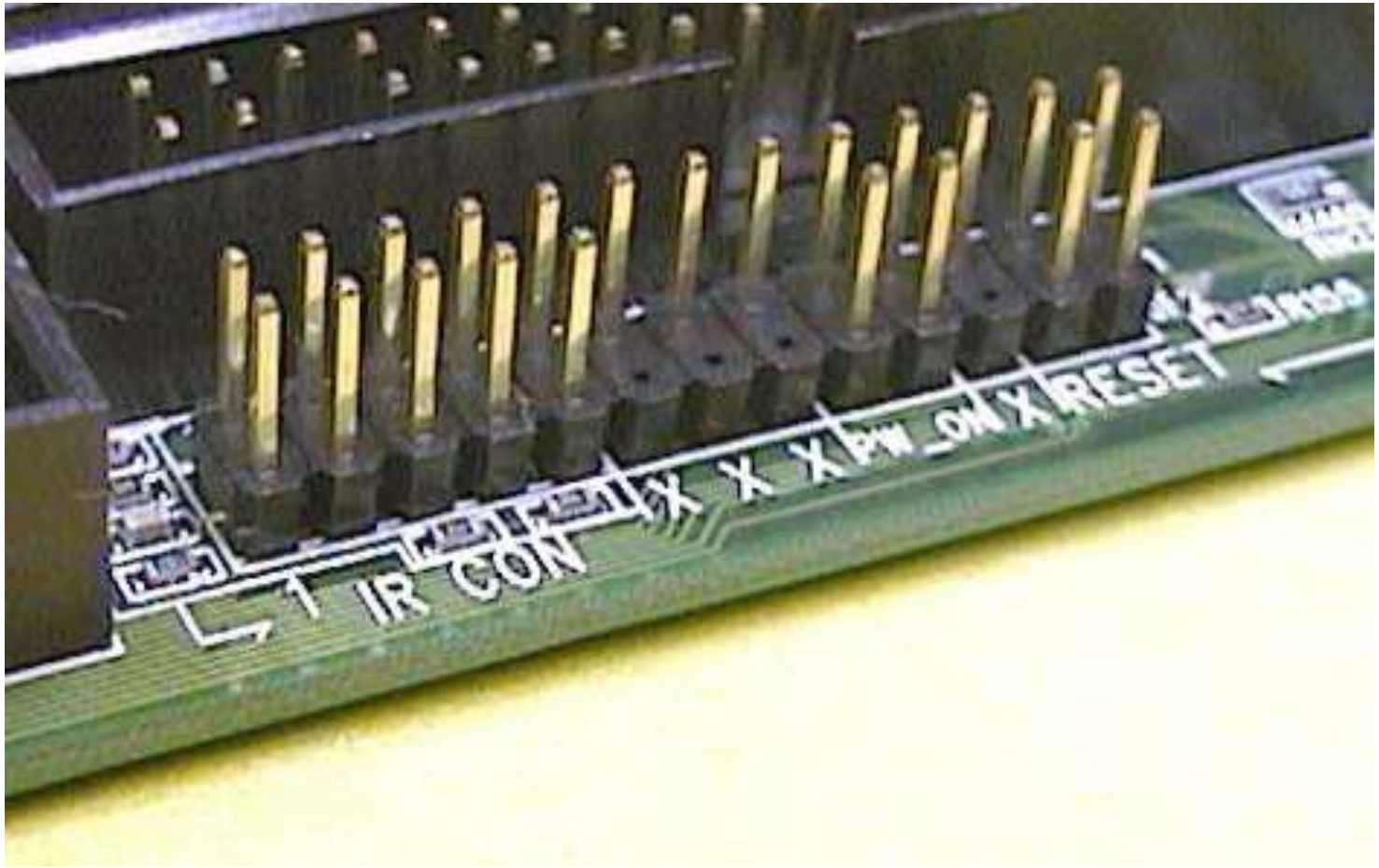



+12V Power Connector

# Posicionamento do conector ATX auxiliar

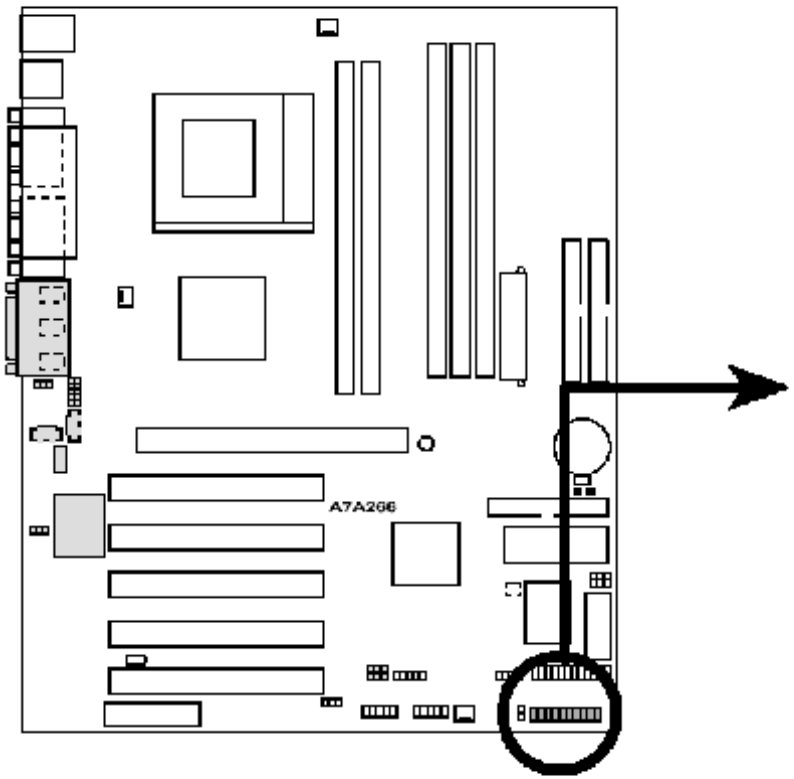



**P4T ATX &**
**Auxiliary Power Connectors**

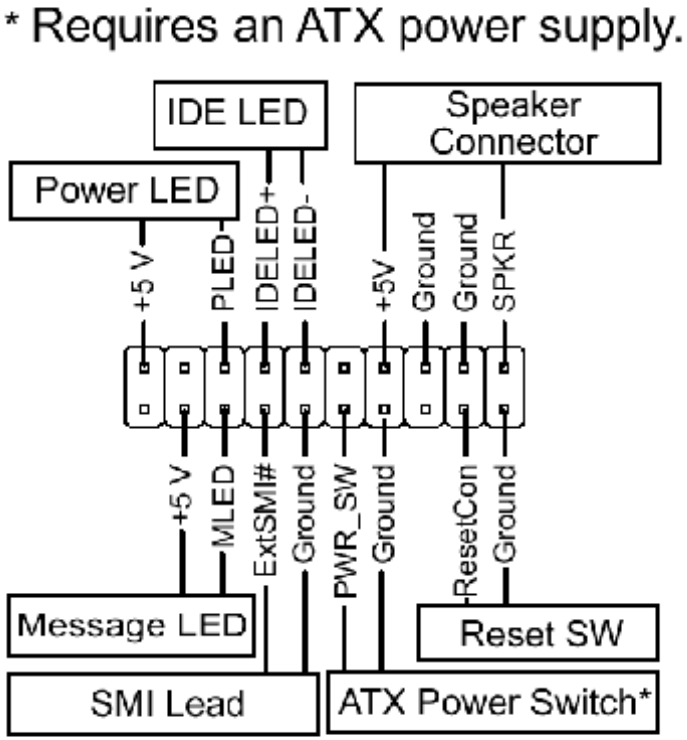



# Conectores do Gabinete

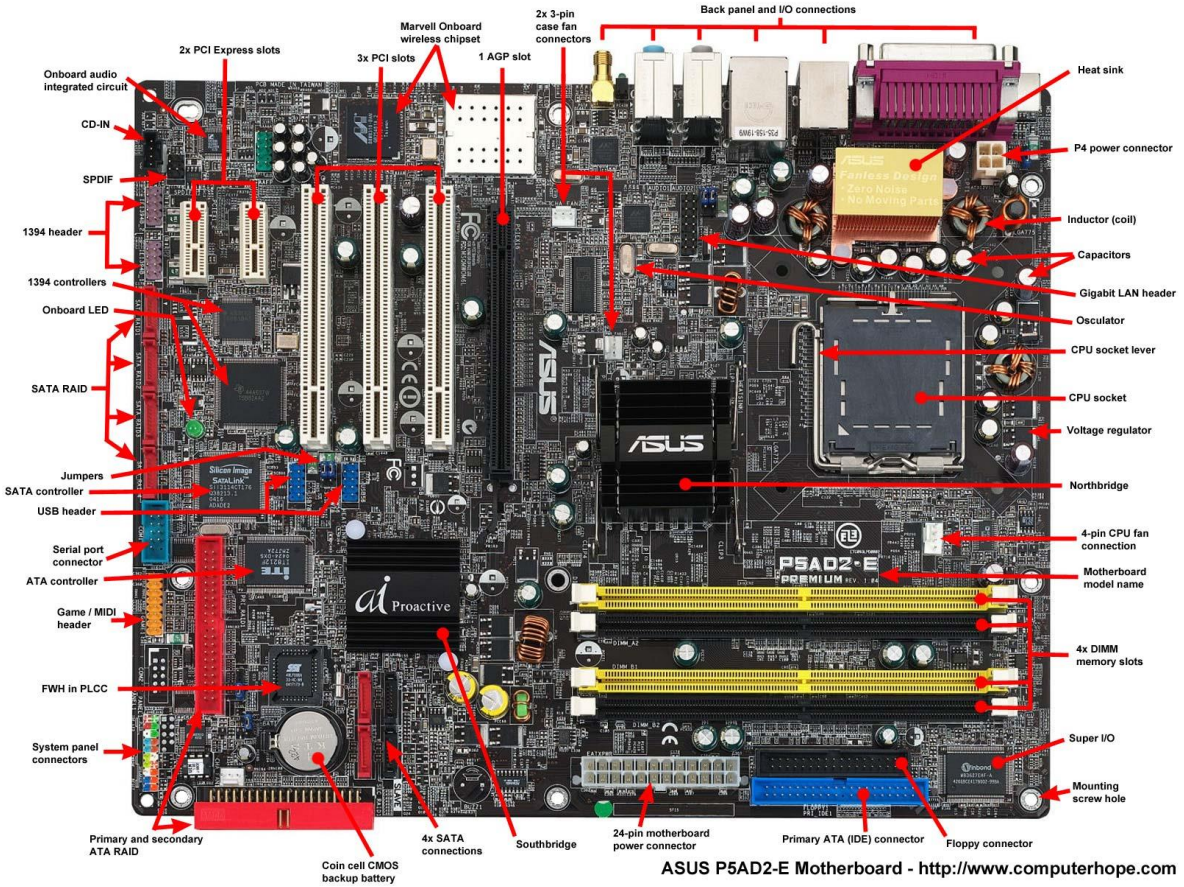
# Exemplo de Instruções de Conexões

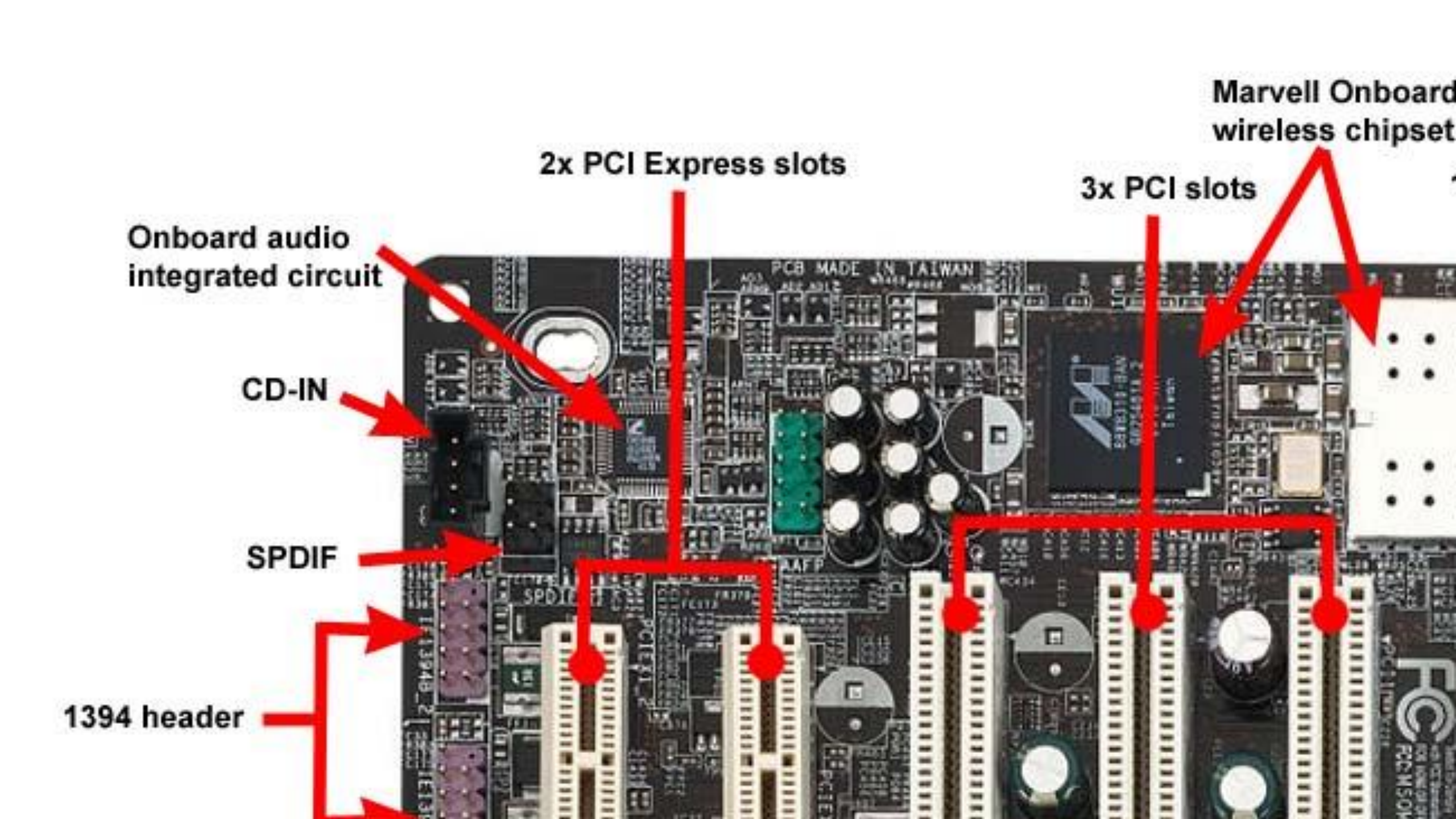


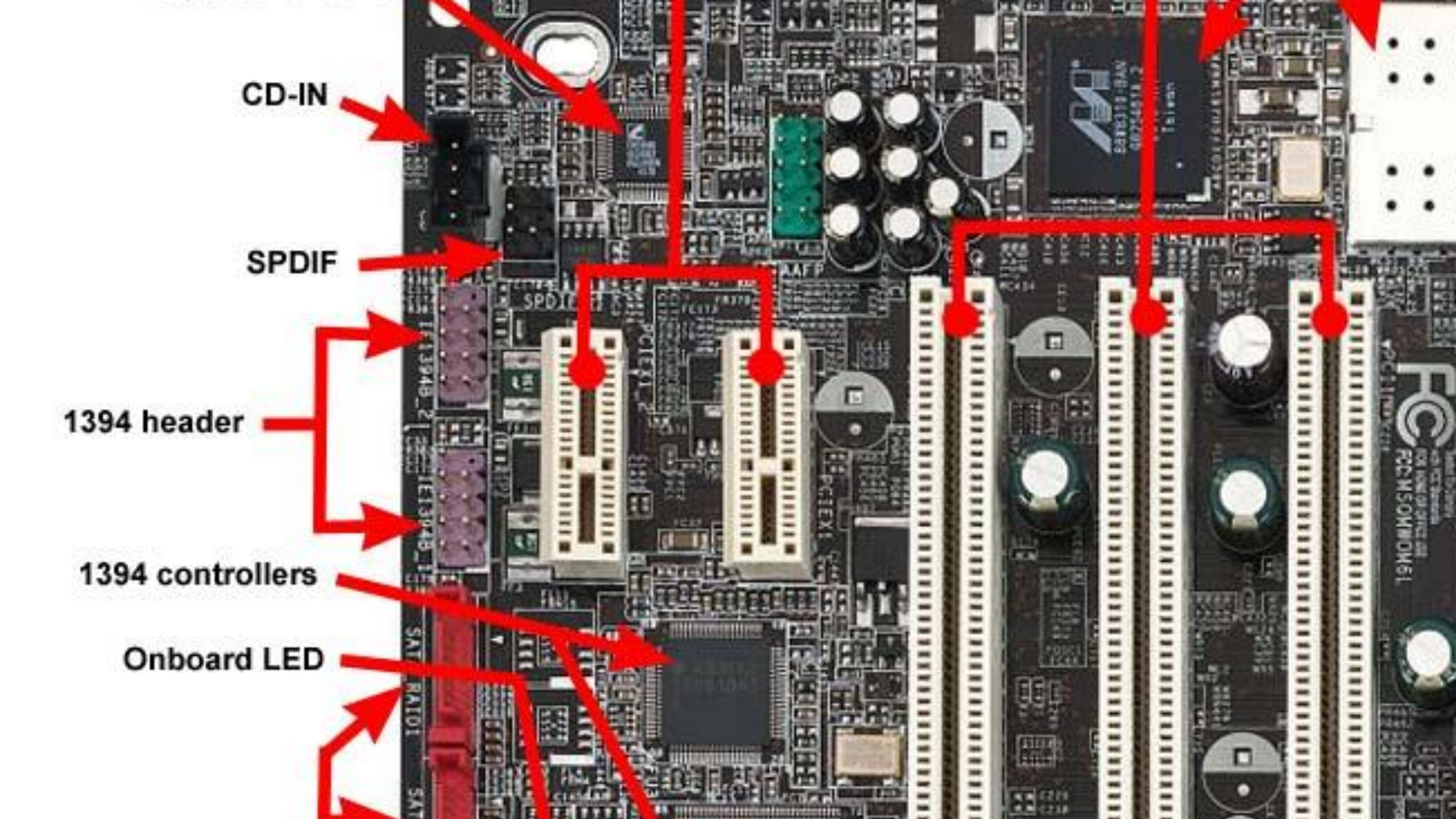

**A7A266 System Panel Connectors**

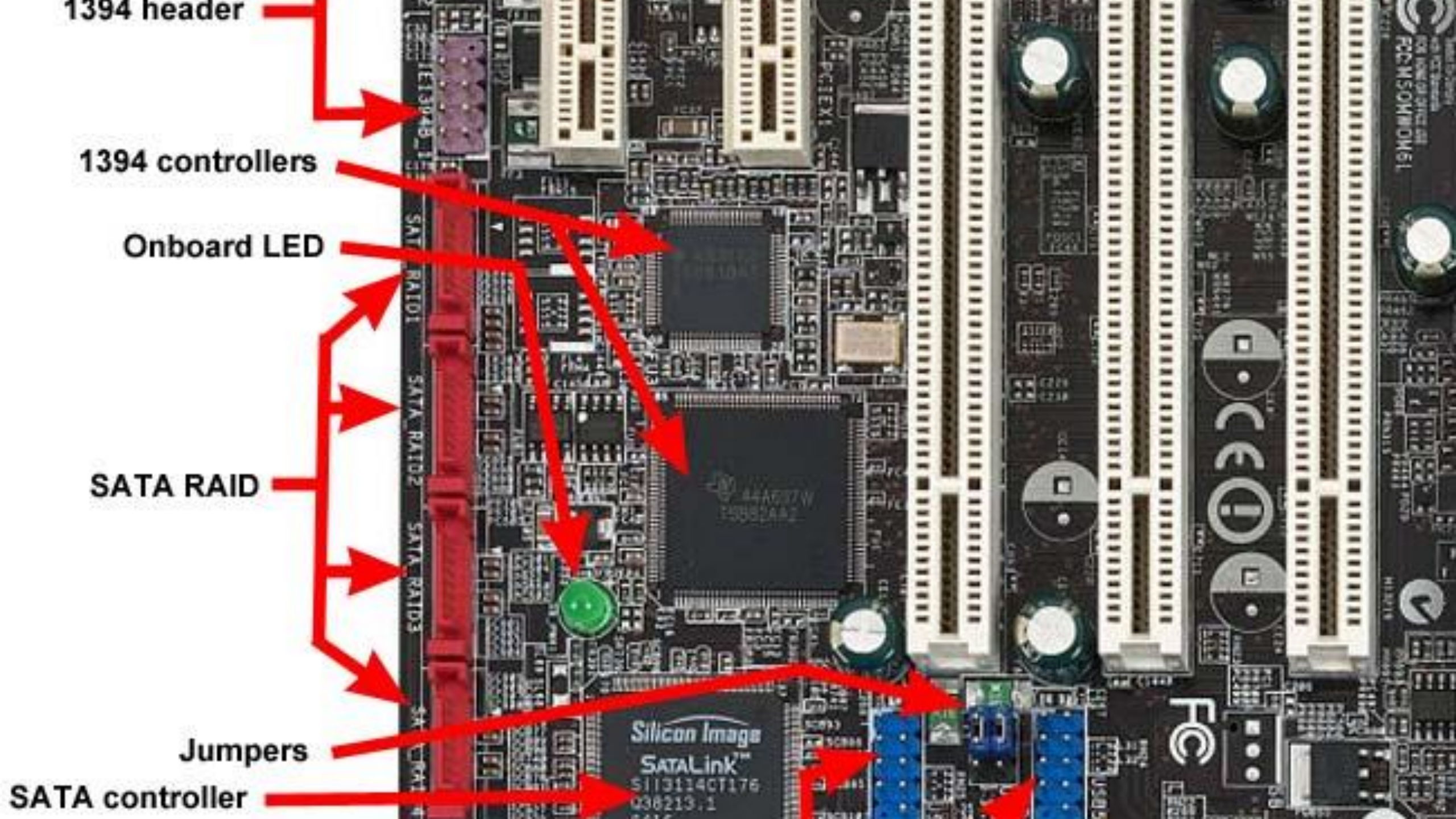


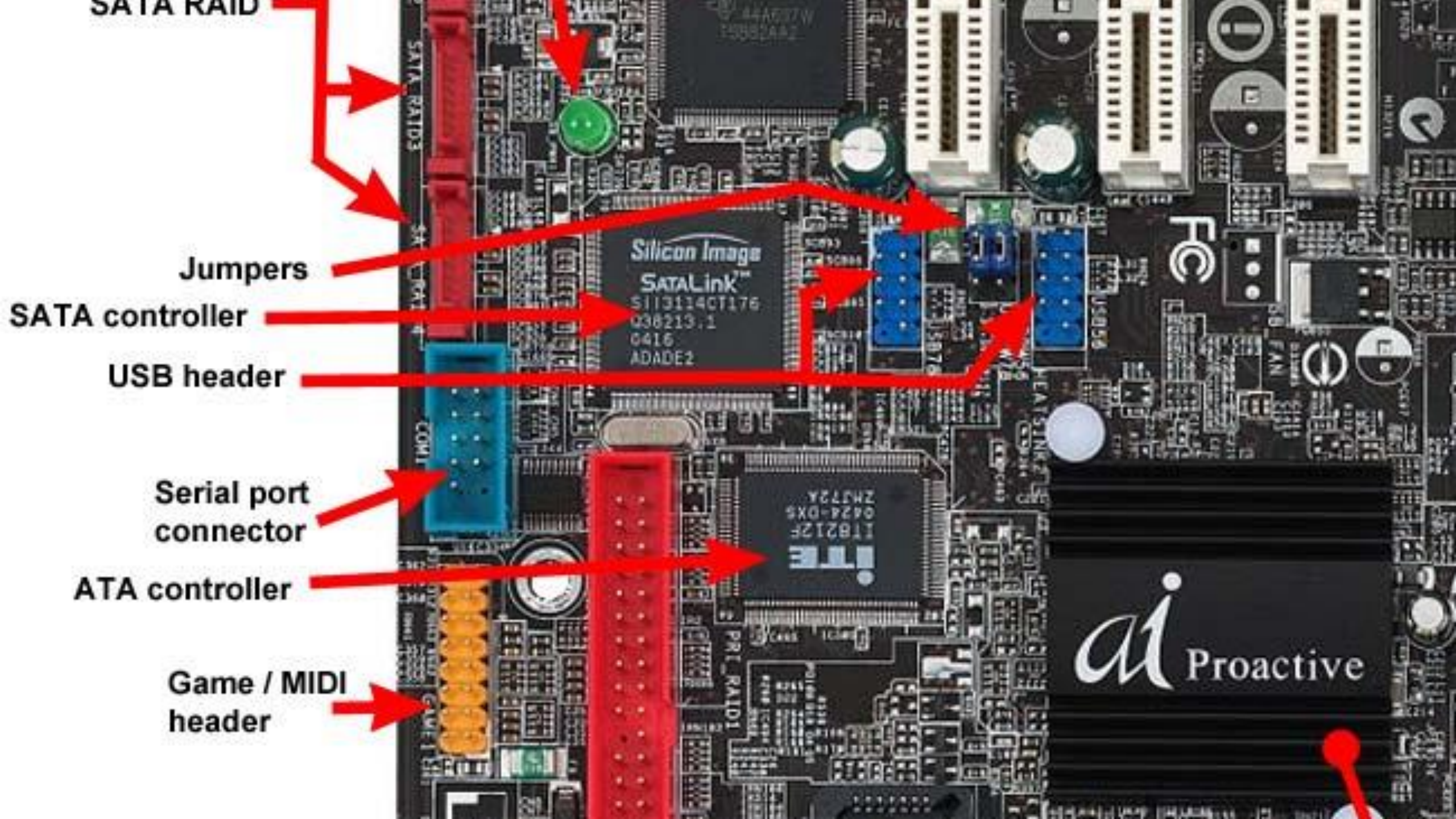
# Analisando os componentes

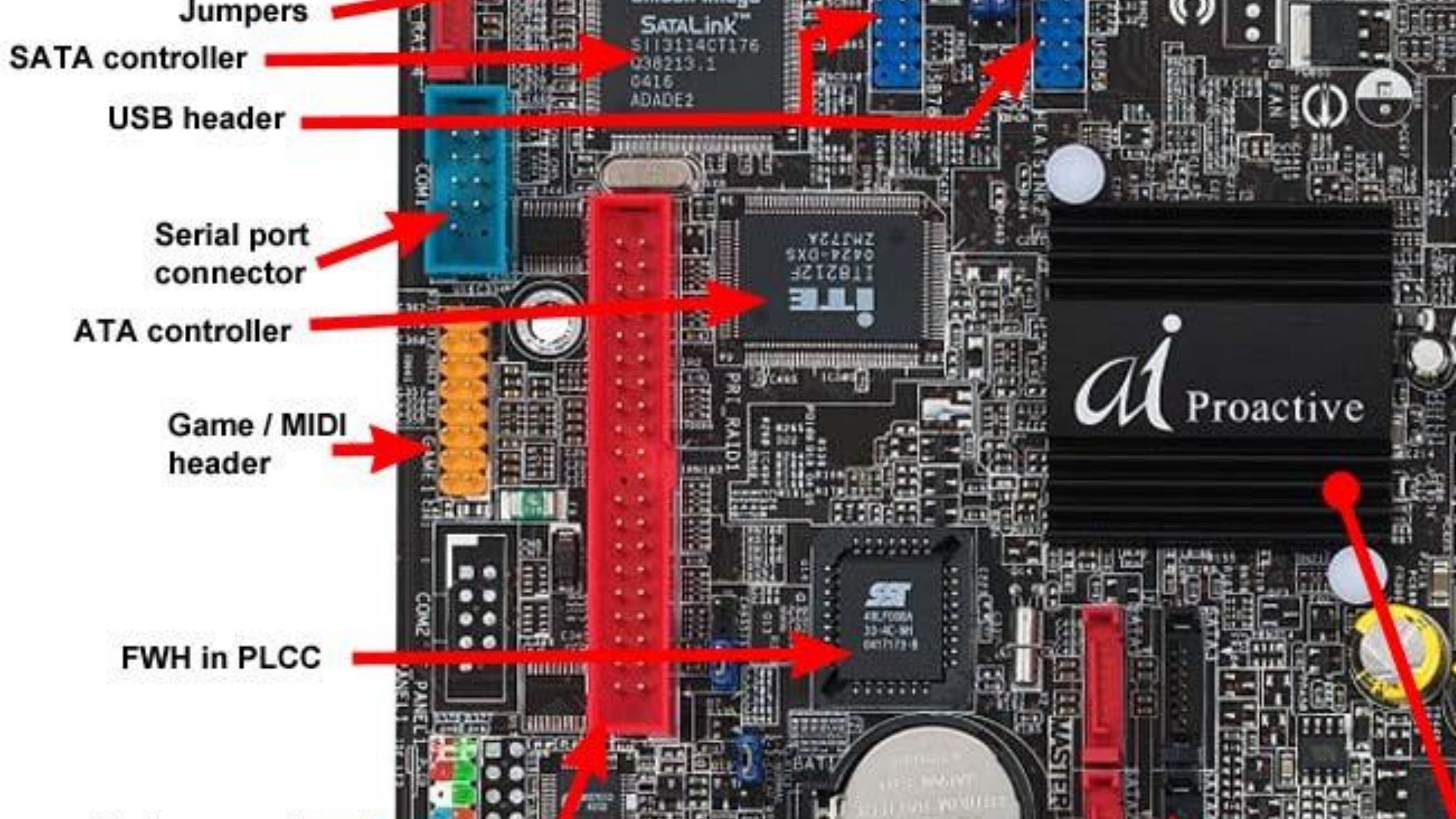


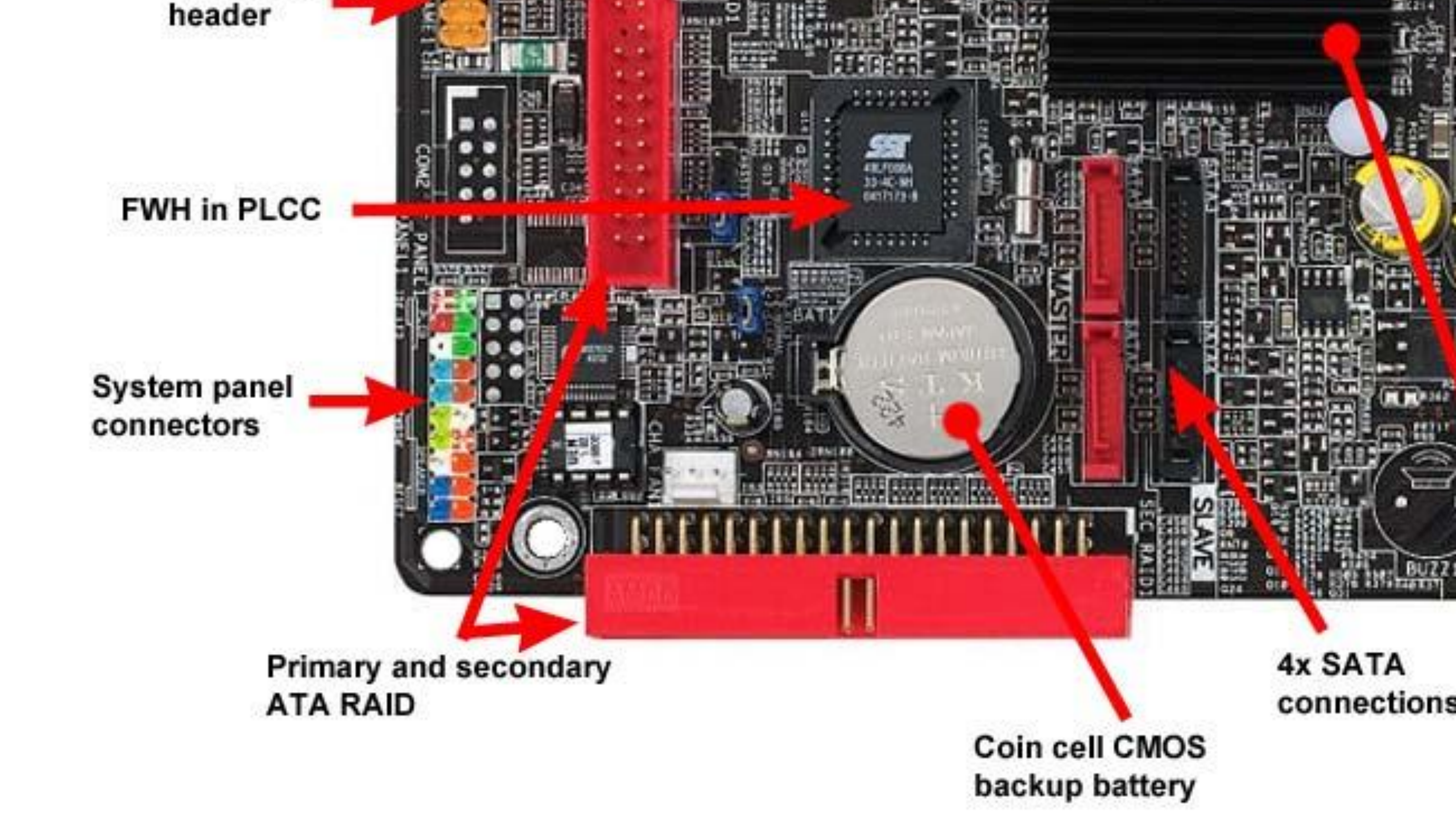

Marvell Onboard
wireless chipset
2x PCI Express slots
3x PCI slots
Onboard audio
integrated circuit
CD-IN
SPDIF
1394 header
PCB MADE IN TAIWAN

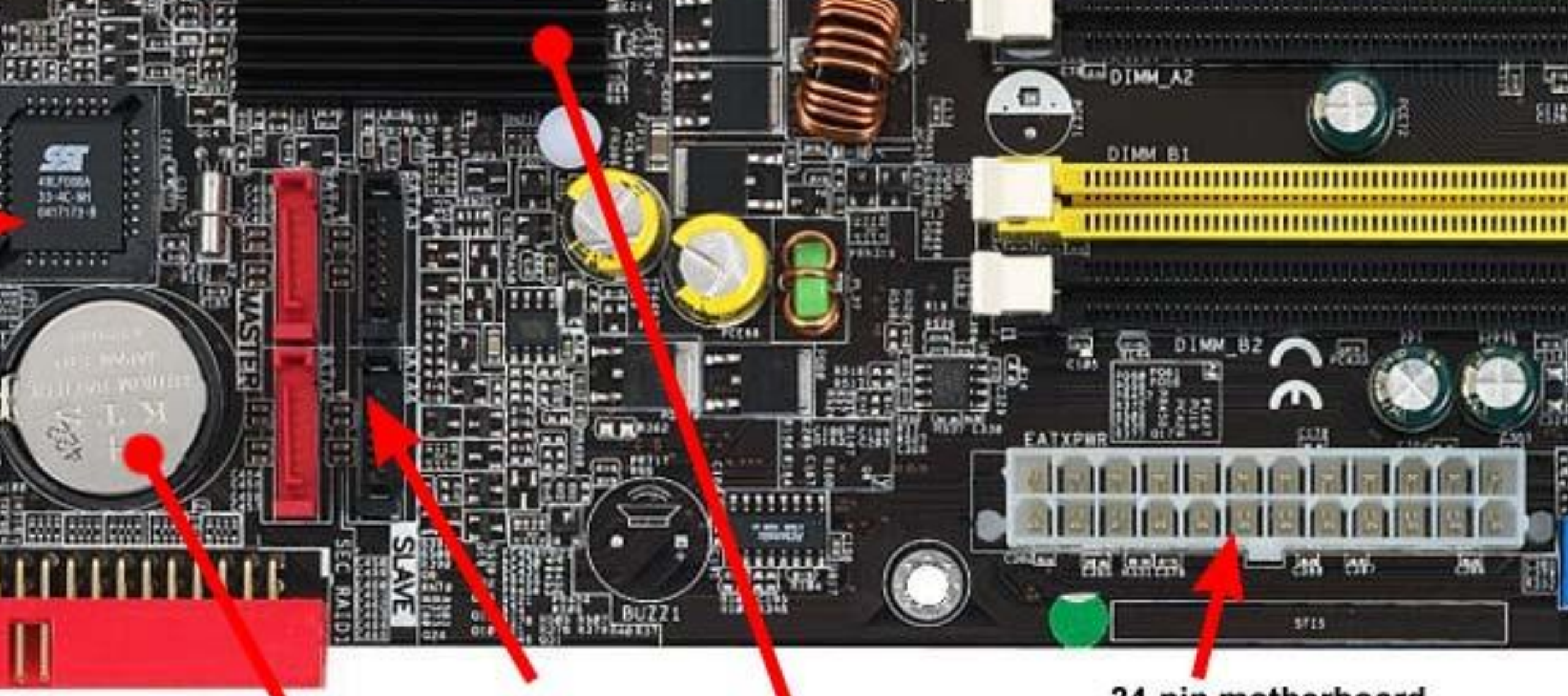

CD-IN
SPDIF
1394 header
1394 controllers
Onboard LED


1394 header
1394 controllers
Onboard LED
SATA RAID
Jumpers
SATA controller
SATA_RAID1
SATA_RAID2
SATA_RAID3
Silicon Image
SATALink
SII3114CT176
038213.1


SATA RAID
Jumpers
SATA controller
USB header
Serial port connector
ATA controller
Game / MIDI header
Silicon Image
SATALink
Proactive


Jumpers
SATA controller
USB header
Serial port connector
ATA controller
Game / MIDI header
FWH in PLCC
SATALink
ai Proactive


header
FWH in PLCC
System panel connectors
Primary and secondary ATA RAID
Coin cell CMOS backup battery
4x SATA connections
MASTER
SLAVE



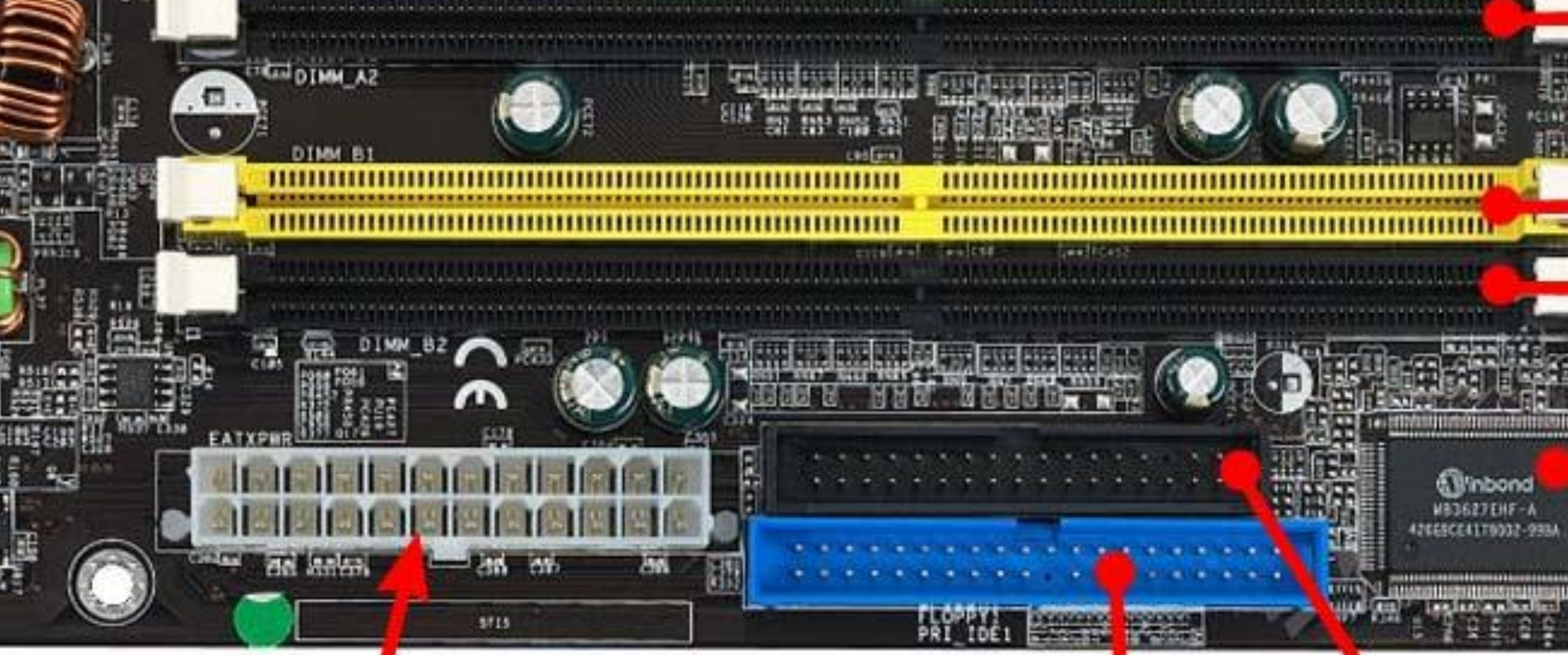

Coin cell CMOS backup battery

4x SATA connections

Southbridge

24-pin motherboard power connector

# ASUS P5AI



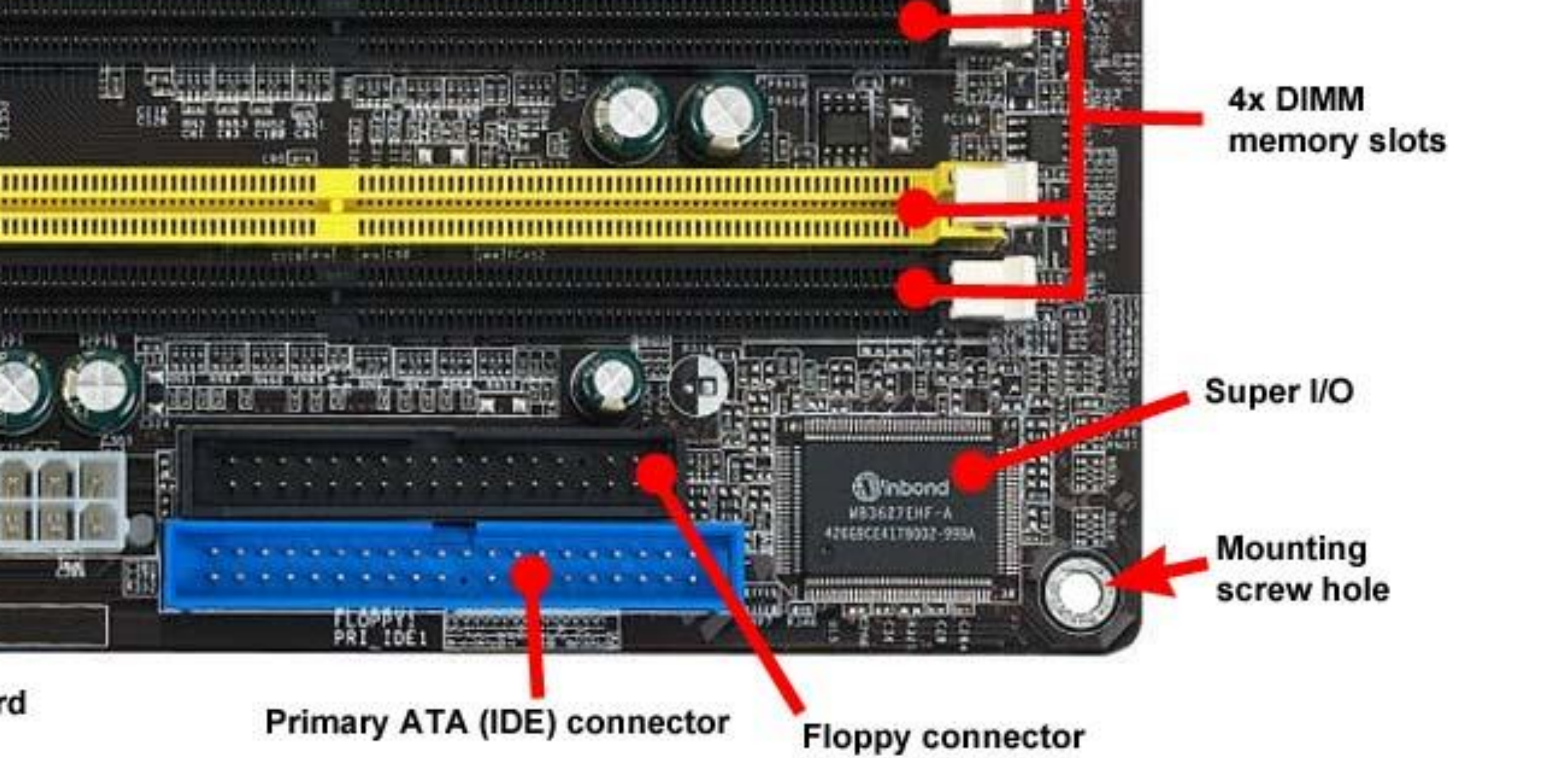

outhbridge

24-pin motherboard power connector

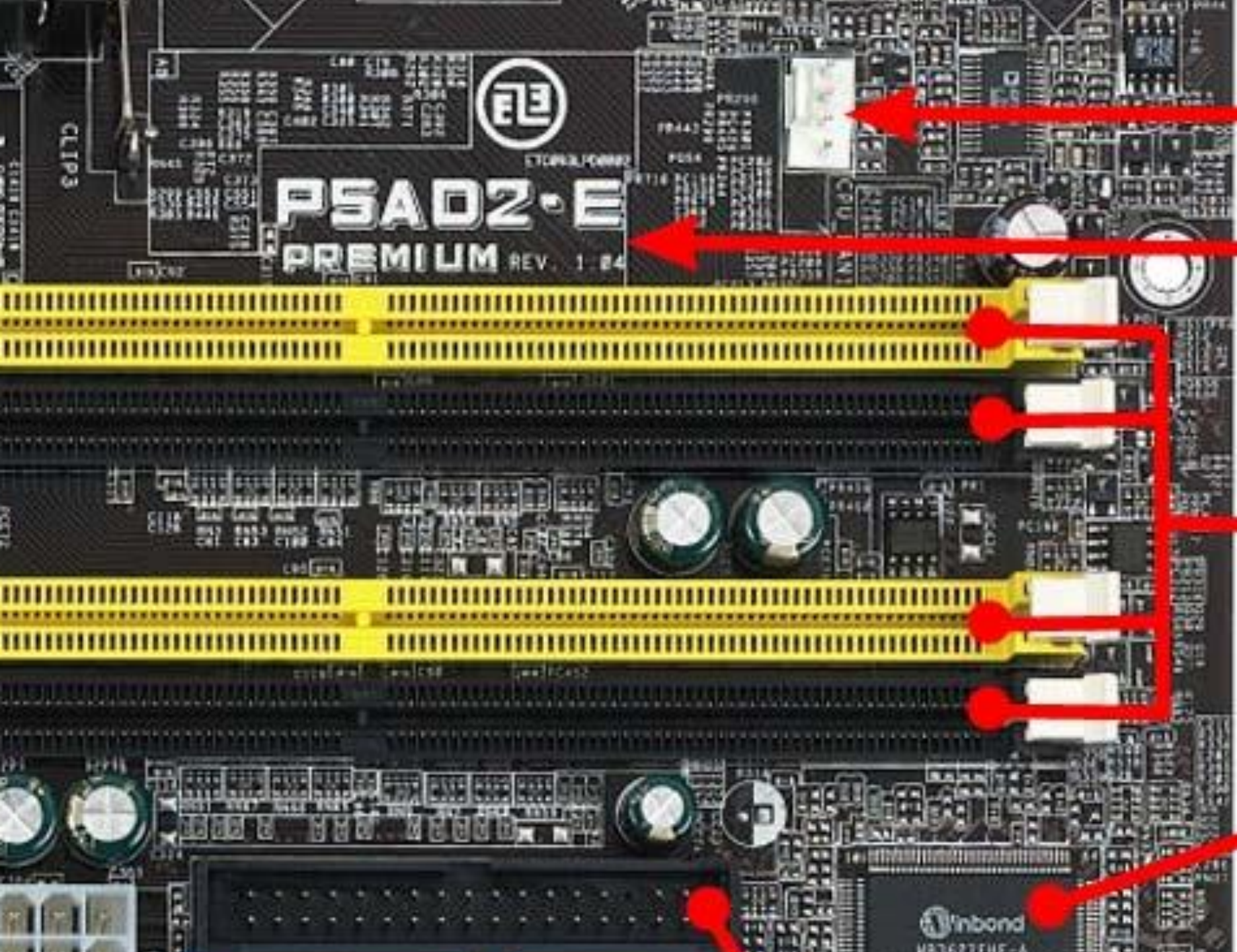
Primary ATA (IDE) connector

Floppy con

# ASUS P5AD2-E Motherboard - http://www




S P5AD2-E Motherboard - http://www.computerhope.com

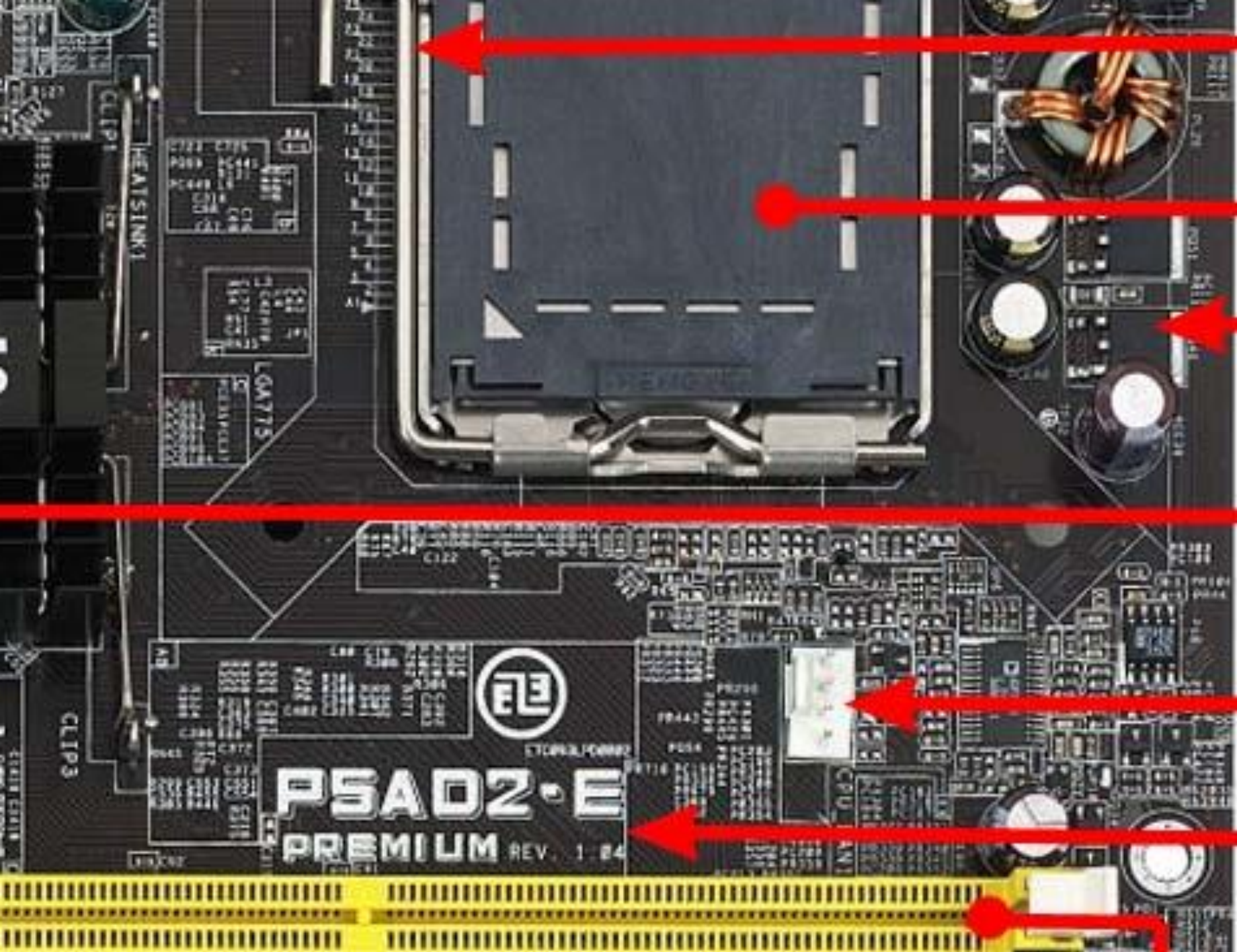


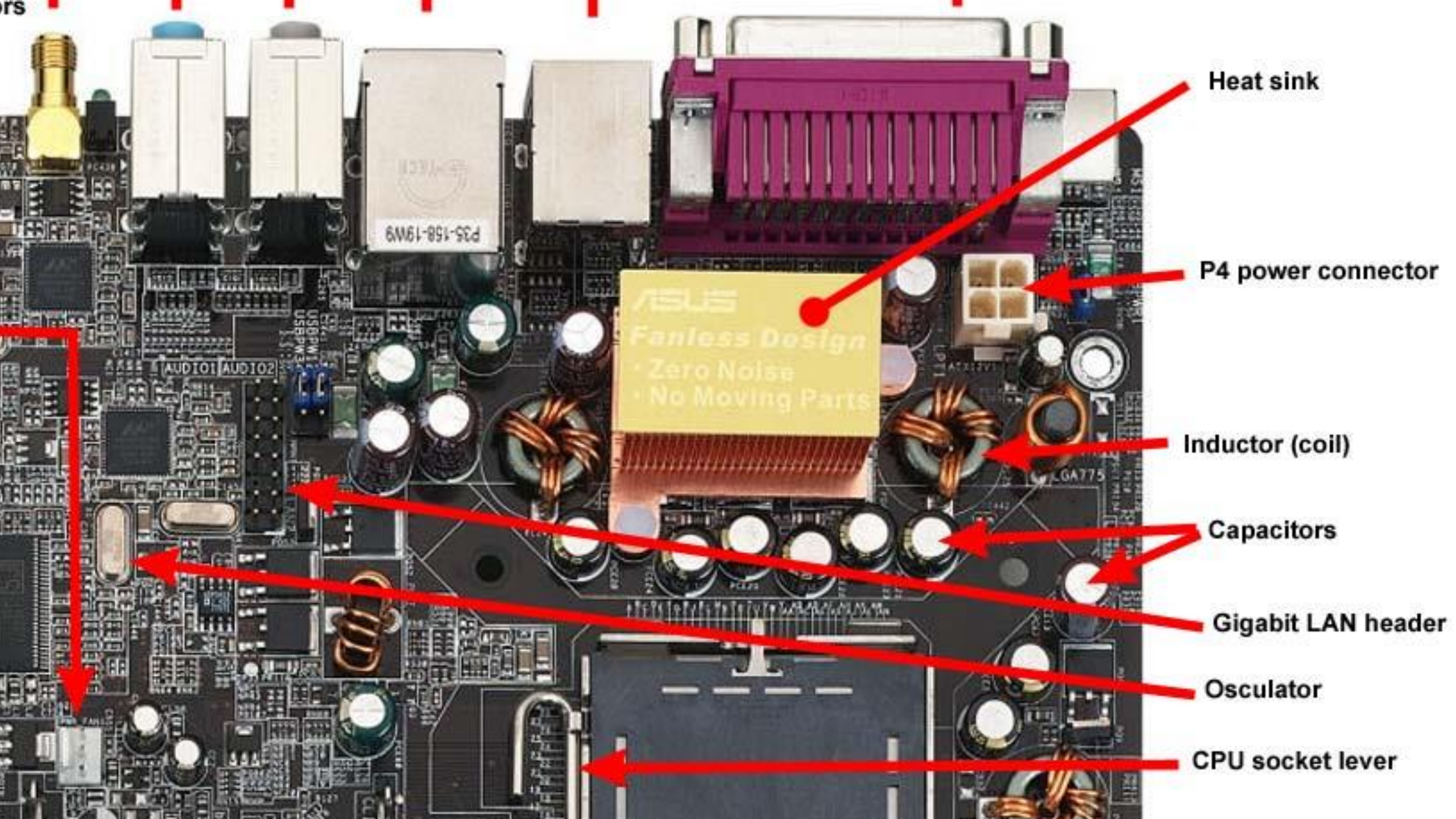

4-pin CPU fan connection

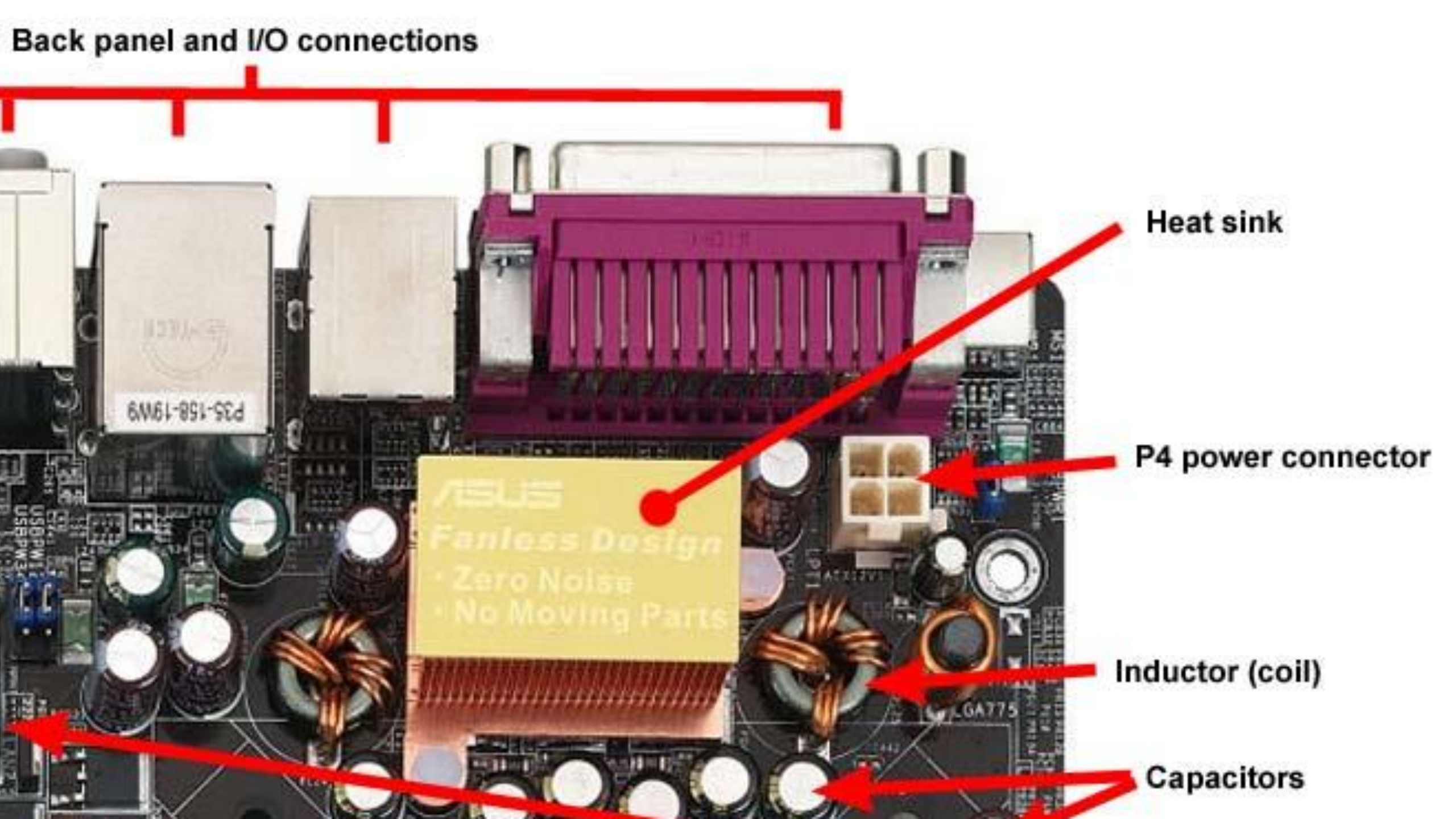
Motherboard model name

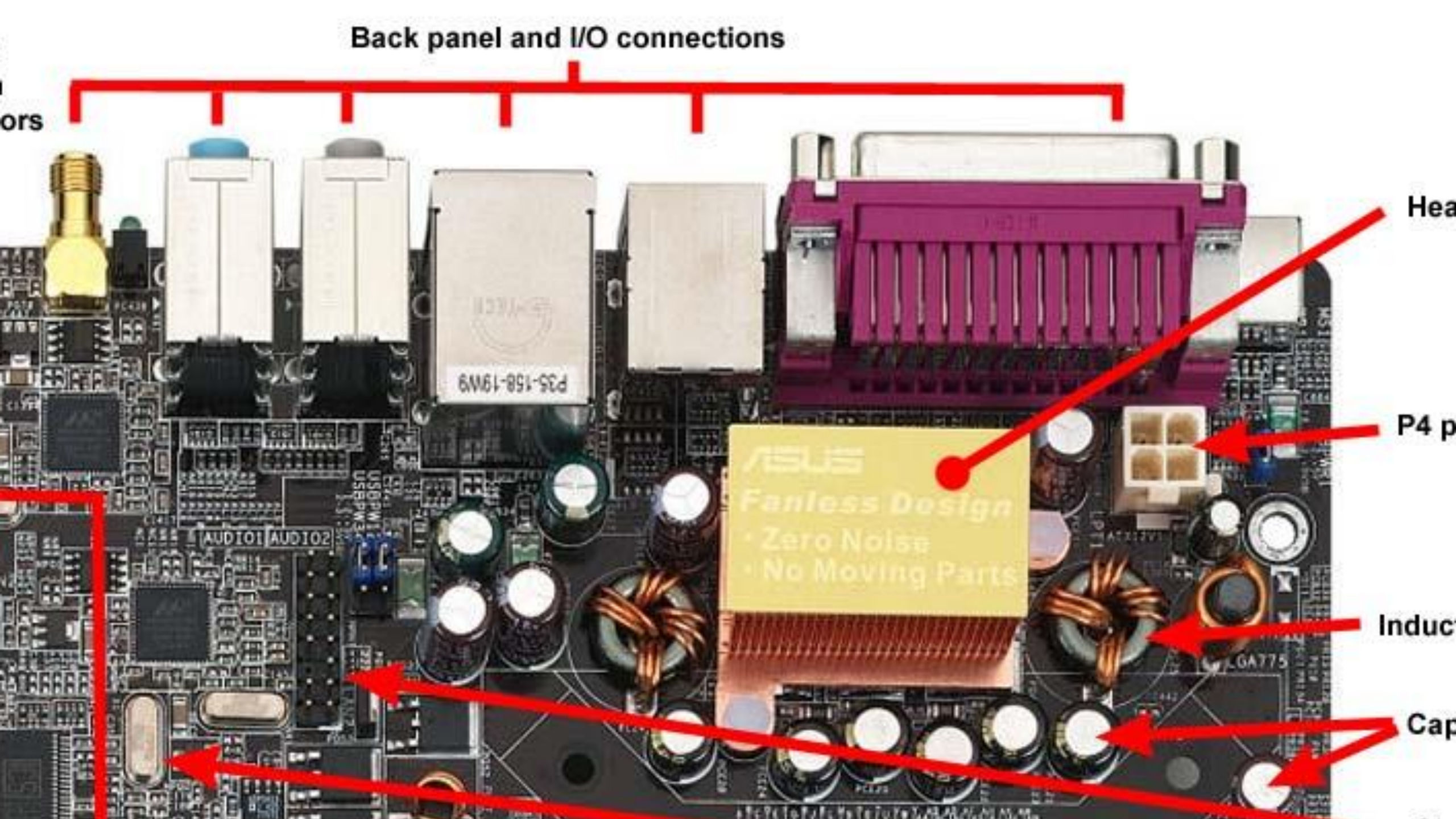
4x DIMM memory slots

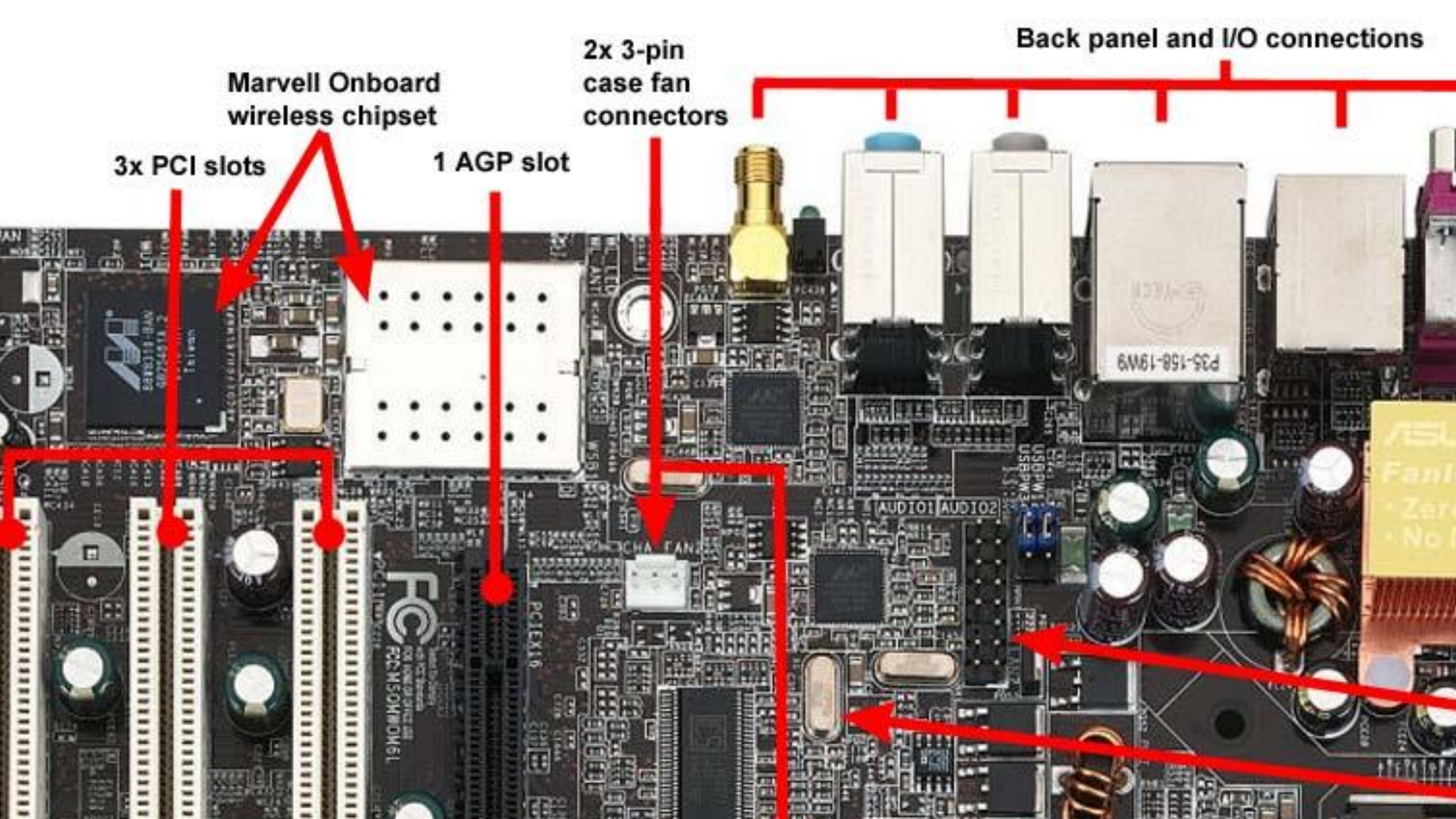
Super I/O

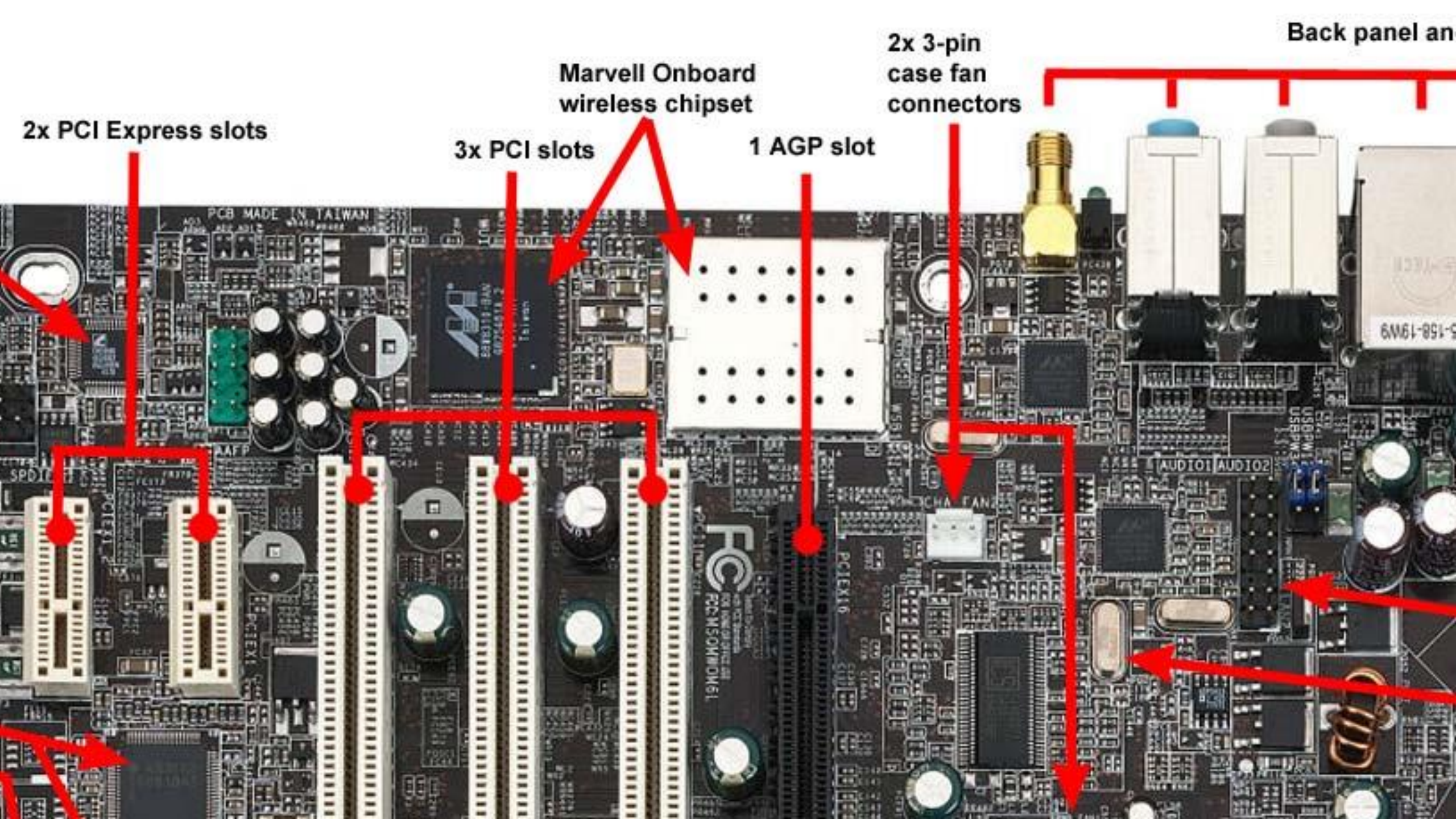

CPU socket lever
CPU socket
Voltage regulator
Northbridge
4-pin CPU fan connection
Motherboard model name
P5AD2-E
PREMIUM

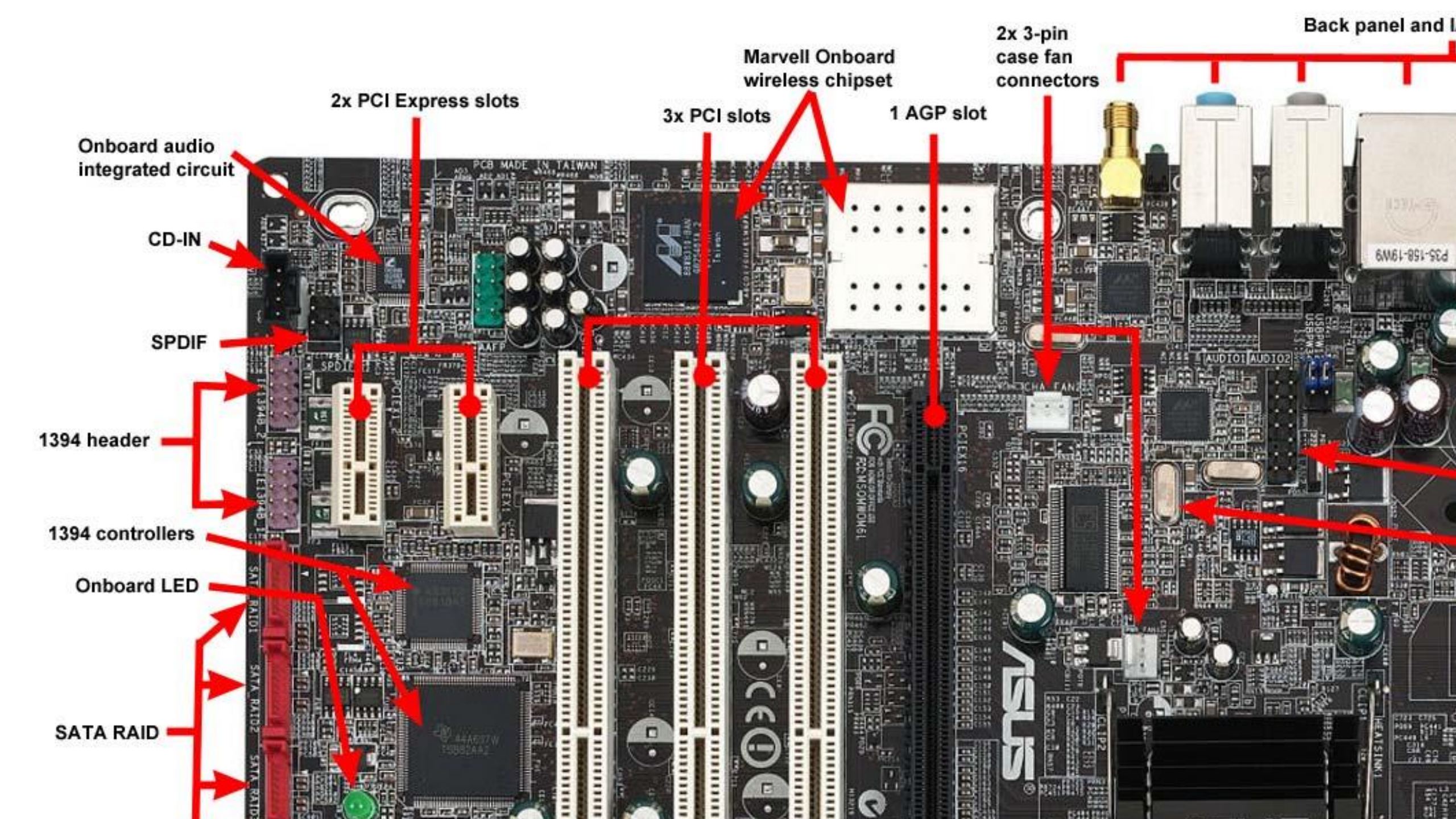

Heat sink
P4 power connector
Inductor (coil)
Capacitors
Gigabit LAN header
Osculator
CPU socket lever
ASUS
Fanless Design
· Zero Noise
· No Moving Parts
AUDIO1
AUDIO2
LGA775

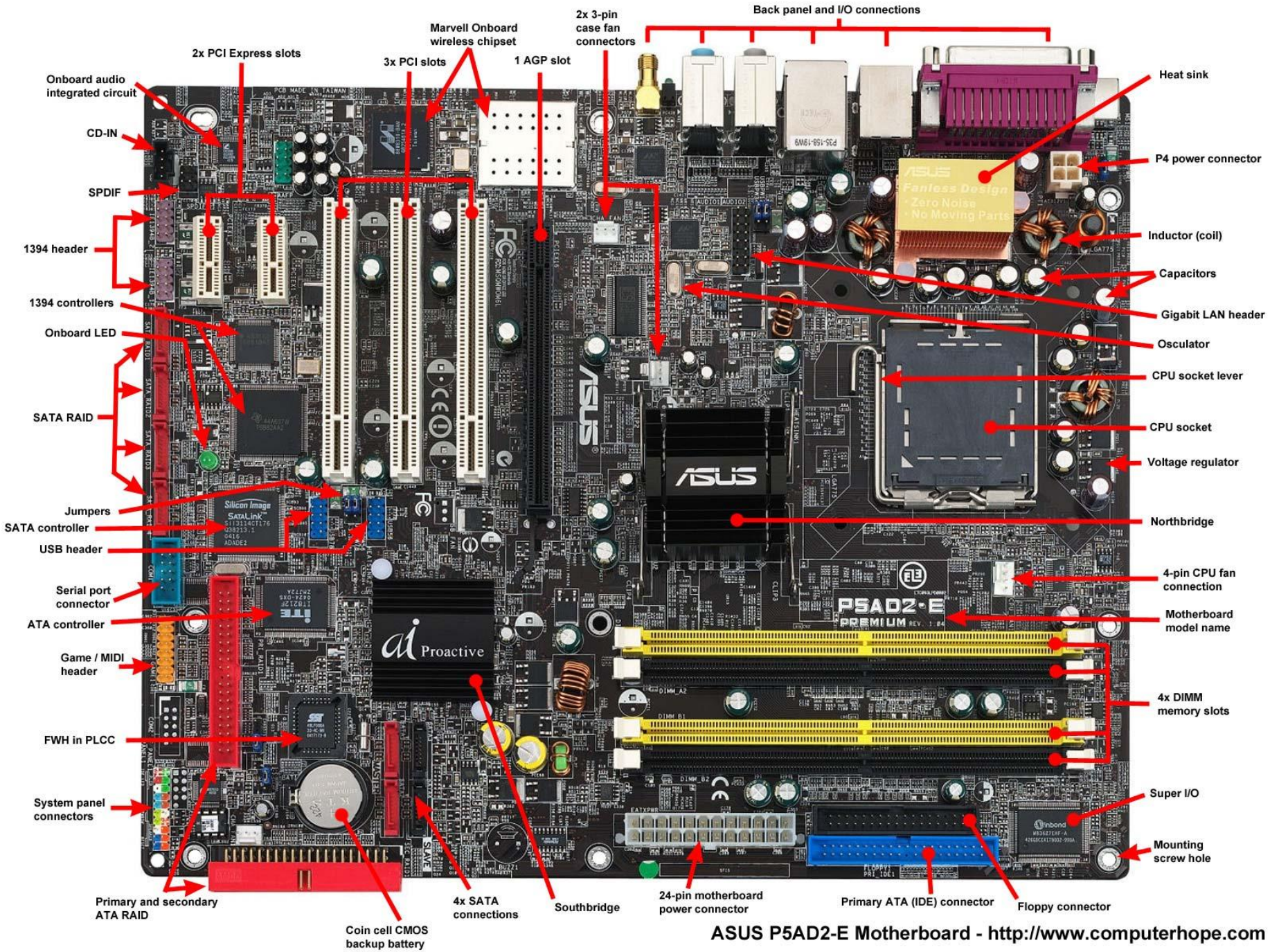

Back panel and I/O connections
Heat sink
P4 power connector
Inductor (coil)
Capacitors
ASUS
Fanless Design
· Zero Noise
· No Moving Parts
LGA775


Back panel and I/O connections
ors
Hea
P4 p
Induc
Cap
Fanless Design
· Zero Noise
· No Moving Parts
AUDIO1
AUDIO2
LGA775


Back panel and I/O connections
2x 3-pin case fan connectors
Marvell Onboard wireless chipset
3x PCI slots
1 AGP slot
AUDIO1
AUDIO2
PCIEX16

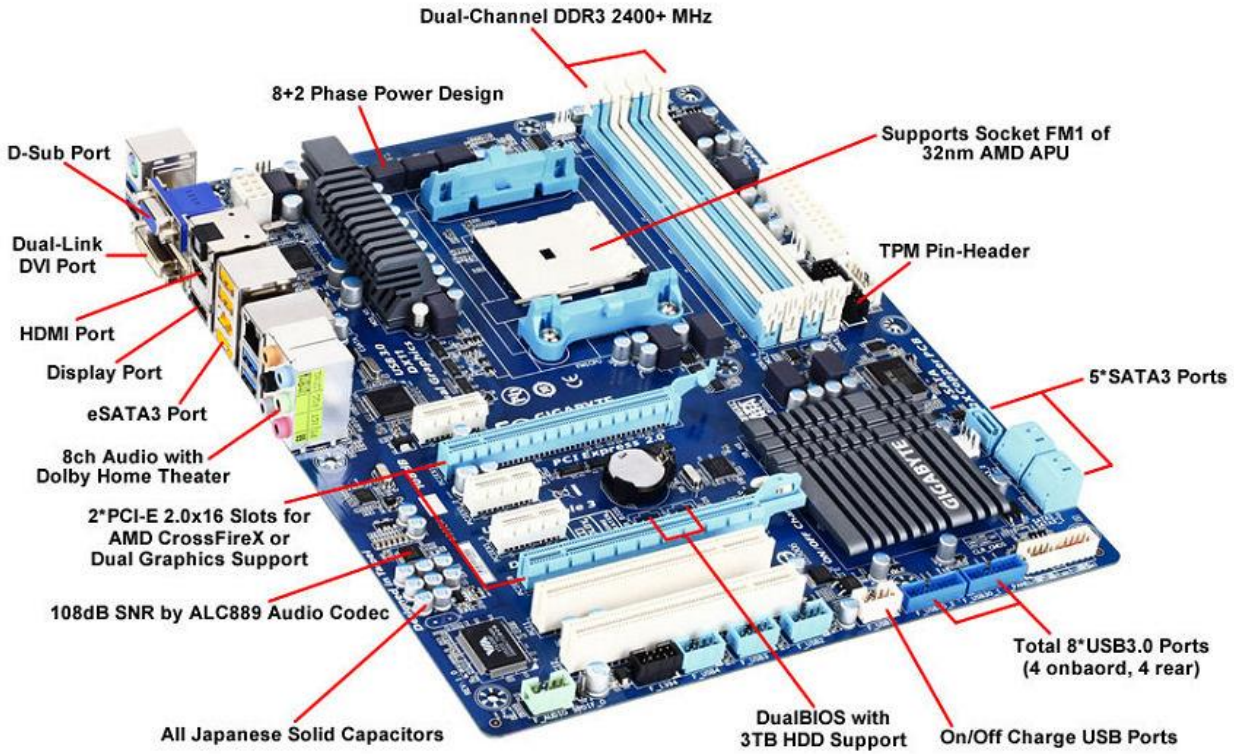

2x PCI Express slots
3x PCI slots
Marvell Onboard
wireless chipset
1 AGP slot
2x 3-pin
case fan
connectors
Back panel an
PCB MADE IN TAIWAN
AUDIO1
AUDIO2
PCIEX16

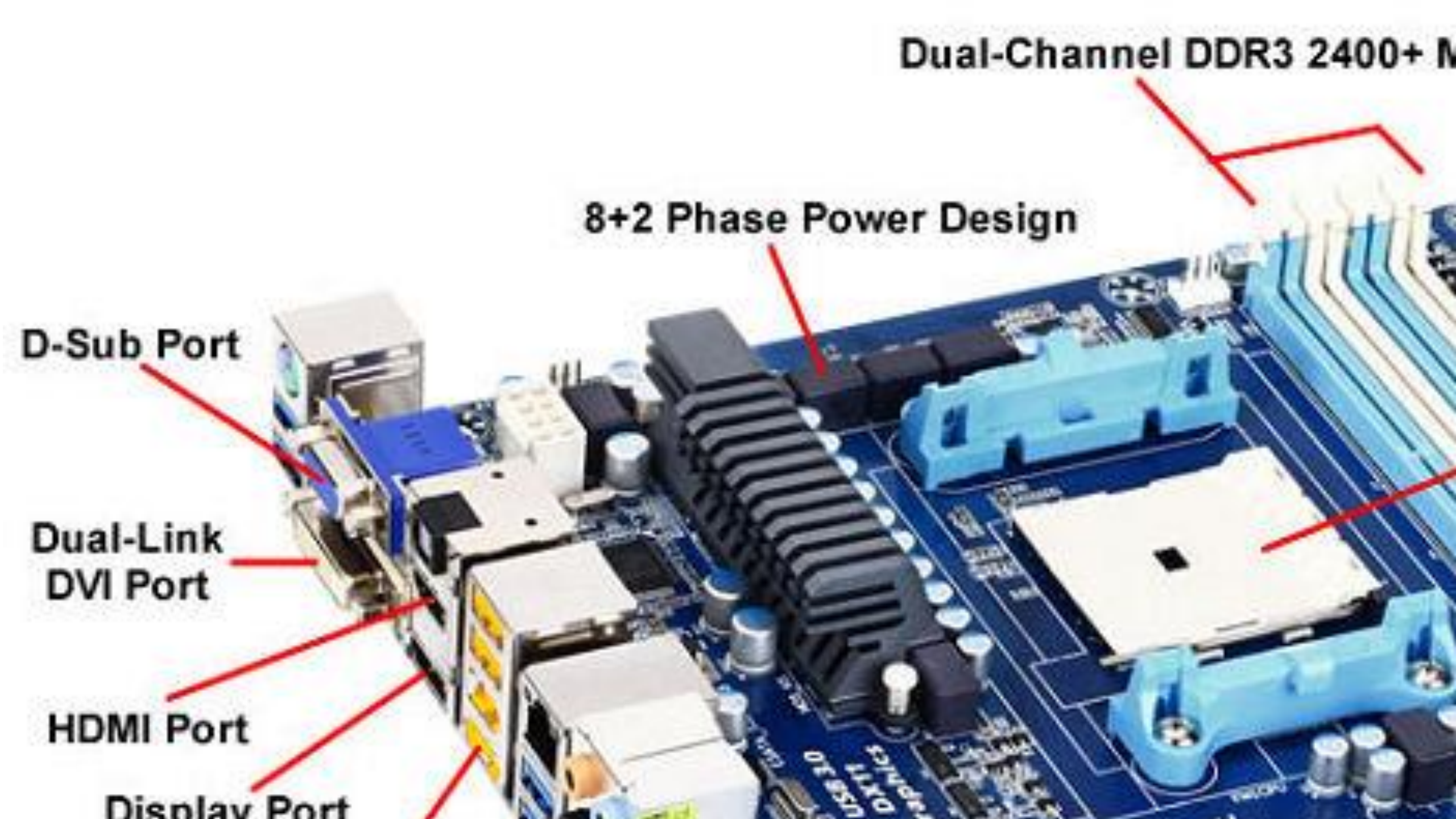

Back panel and I
2x 3-pin
case fan
connectors
Marvell Onboard
wireless chipset
2x PCI Express slots
3x PCI slots
1 AGP slot
Onboard audio
integrated circuit
CD-IN
SPDIF
1394 header
1394 controllers
Onboard LED
SATA RAID



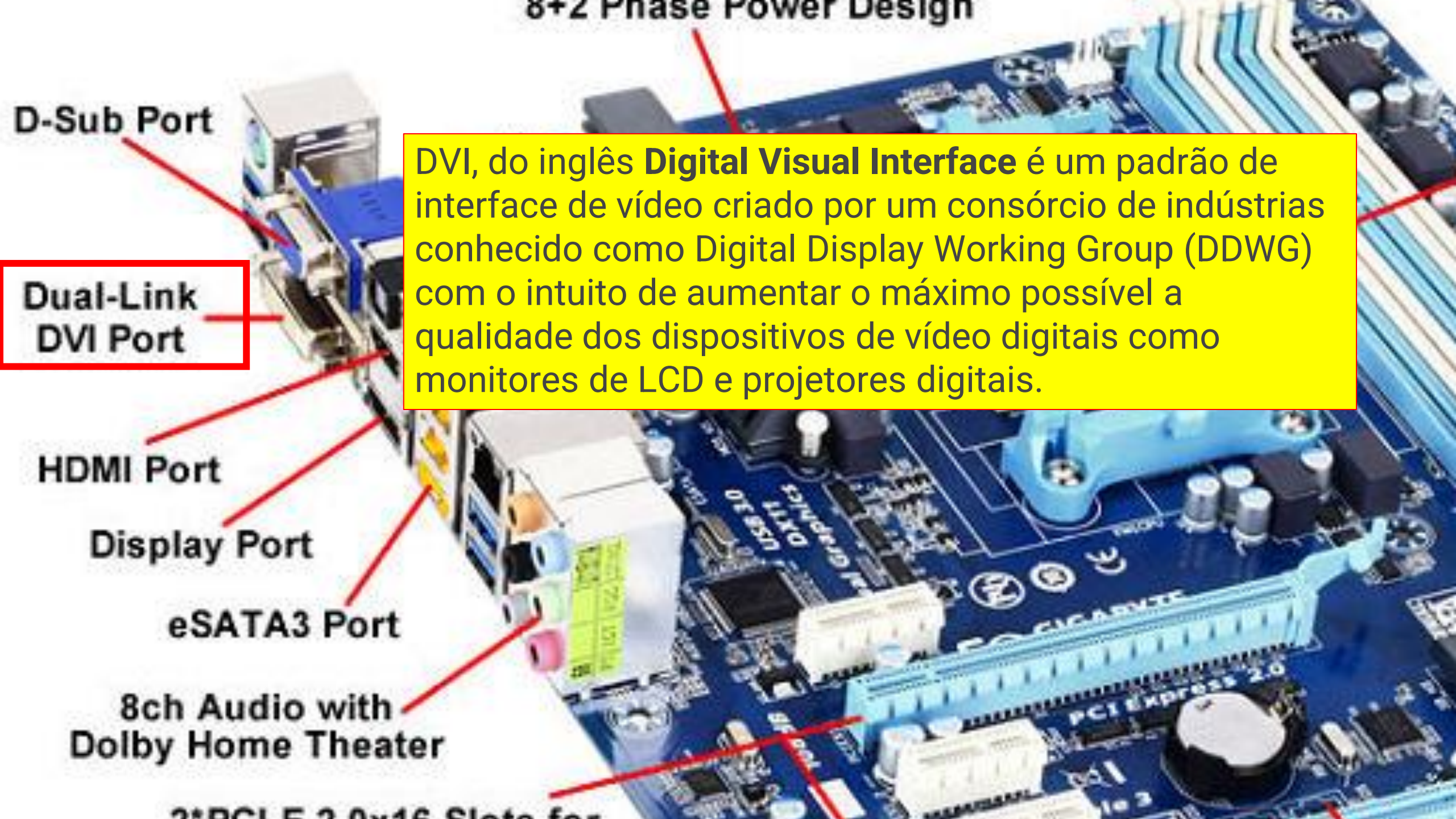

ASUS P5AD2-E Motherboard - http://www.computerhope.com

# Componentes



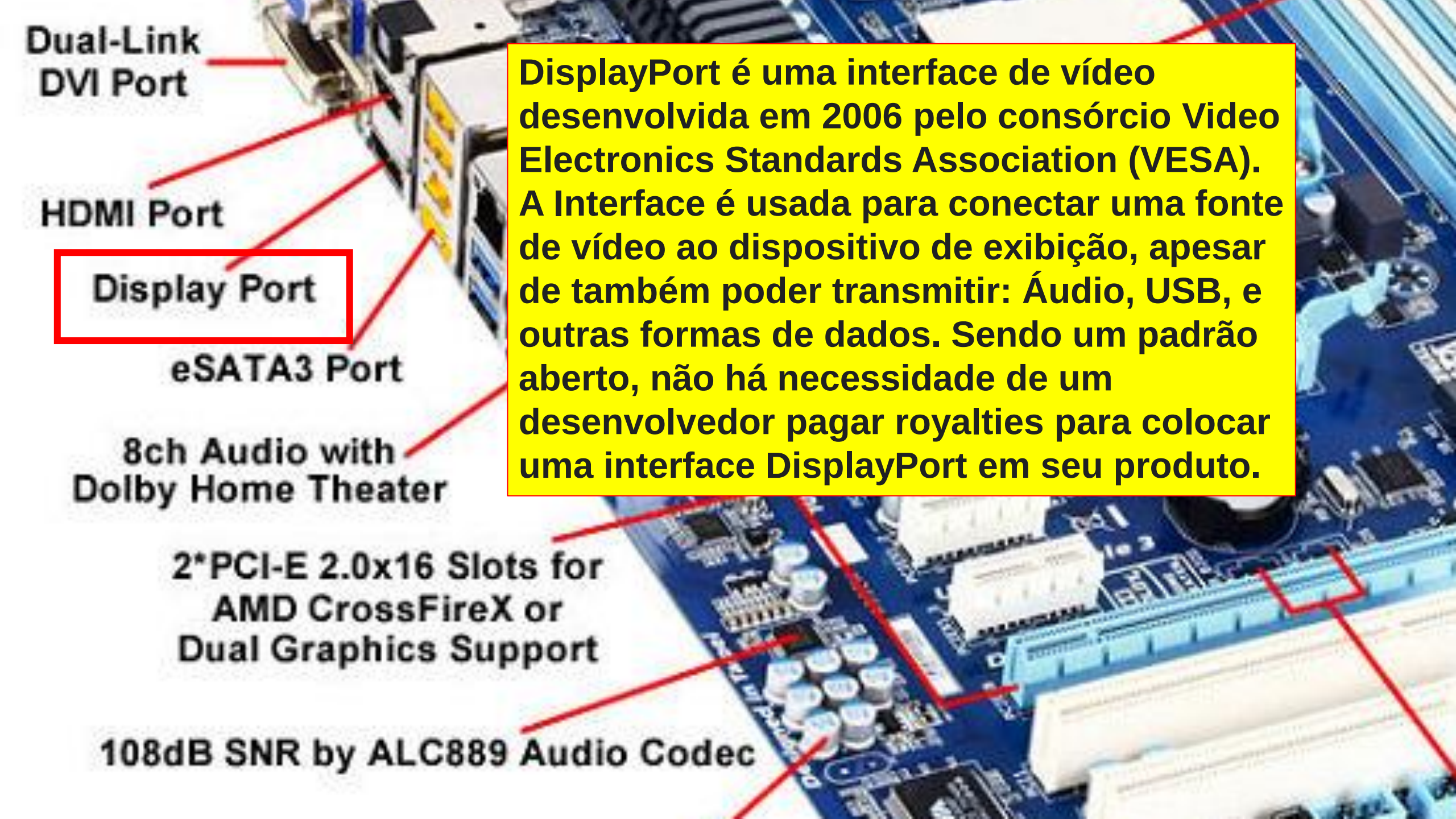

Dual-Channel DDR3 2400+ M
8+2 Phase Power Design
D-Sub Port
Dual-Link
DVI Port
HDMI Port
Display Port


O termo D-Sub significa "D-Subminiature", ou conector subminiatura em D. Esses conectores foram criados na década de 1950, e ainda são usados nos computadores modernos. Possuem o formato de uma letra D na horizontal, sendo que um dos lados é ligeiramente maior que o outro. Devido ao formato, há apenas um jeito de conectá-lo. Todos os conectores deste tipo possuem um escudo metálico que cerca duas ou mais fileiras de pinos (macho) ou buracos (fêmea). O número de pinos ou buracos dos conectores D-Sub varia entre nove e 100.




DVI, do inglês **Digital Visual Interface** é um padrão de interface de vídeo criado por um consórcio de indústrias conhecido como Digital Display Working Group (DDWG) com o intuito de aumentar o máximo possível a qualidade dos dispositivos de vídeo digitais como monitores de LCD e projetores digitais.


High-Definition Multimedia Interface (HDMI) é uma interface digital que conduz áudio e vídeo entre equipamentos que trabalham com formato digital, capaz de transmitir dados não comprimidos, representando, por isso, uma alternativa melhorada aos padrões com formato analógico, tais como: Radio Frequência, Cabo coaxial, vídeo composto, S-Video, SCART, vídeo componente, Terminal D, e VGA. O HDMI fornece uma interface de comunicação entre qualquer fonte de áudio/vídeo digital - como Blu-ray, leitor de DVD, computador, consoles de videogame, Amplificadores Áudio/Vídeo [1], set-top box - para qualquer dispositivo de som ou vídeo digital, como monitor de computador e TV digital




**DisplayPort é uma interface de vídeo desenvolvida em 2006 pelo consórcio Video Electronics Standards Association (VESA). A Interface é usada para conectar uma fonte de vídeo ao dispositivo de exibição, apesar de também poder transmitir: Áudio, USB, e outras formas de dados. Sendo um padrão aberto, não há necessidade de um desenvolvedor pagar royalties para colocar uma interface DisplayPort em seu produto.**

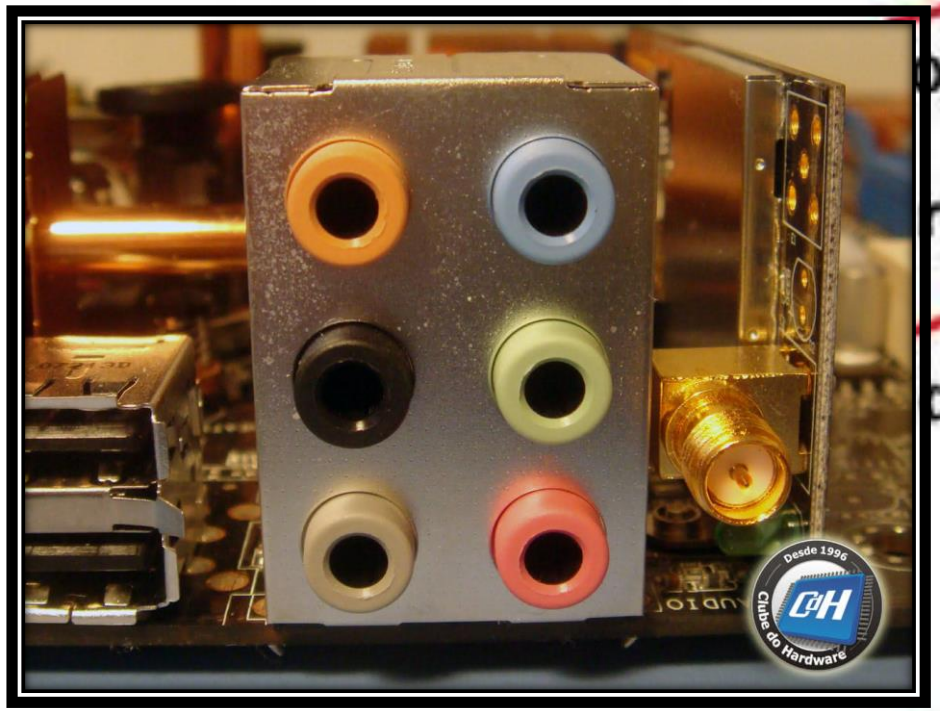

**Chamado "External SATA" ou "eSATA", é possível usar os comprimentos de cabo blindados até 2 metros fora do PC para aproveitar as vantagens dos benefícios que a interface de SATA traz para o armazenamento. O SATA agora está pronto para ser um padrão externo, com cabos, conectores e requisitos de sinal especificamente, lançados como novos padrões em meados de 2004. o eSATA oferece mais desempenho do que as soluções existentes e é Hot pluggable.**

HDMI Port

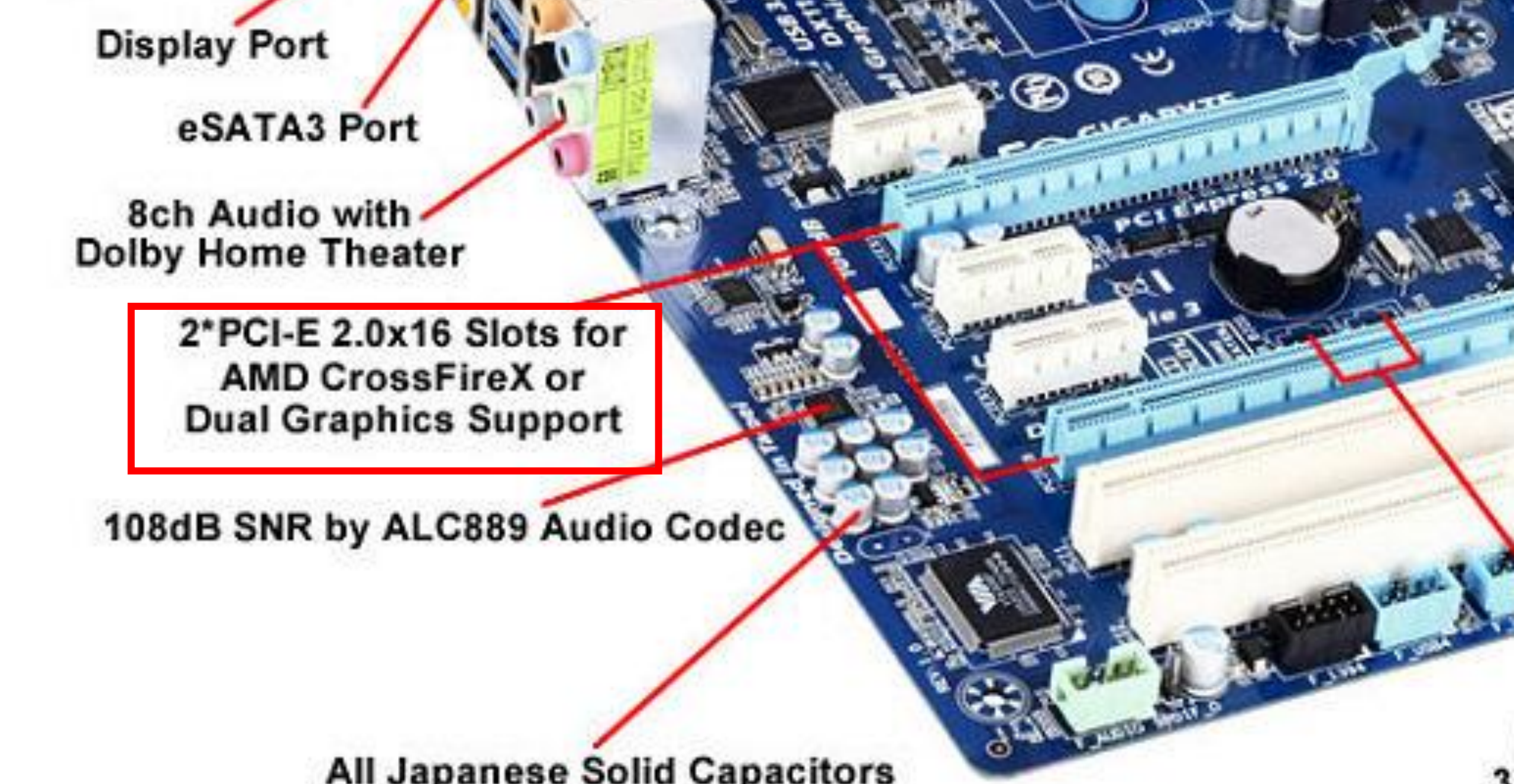
Display Port

eSATA3 Port

8ch Audio with
Dolby Home Theater



Conector de áudio de 8 canais com
Dolby Home Theater


Display Port
eSATA3 Port
8ch Audio with
Dolby Home Theater
2*PCI-E 2.0x16 Slots for
AMD CrossFireX or
Dual Graphics Support
108dB SNR by ALC889 Audio Codec
All Japanese Solid Capacitors
PCI Express 2.0


eSATA3 Port
8ch Audio with
Dolby Home Theater
2*PCI-E 2.0x16 Slots for
AMD CrossFireX or
Dual Graphics Support
108dB SNR by ALC889 Audio Codec
All Japanese Solid Capacitors
PCI Express 2.0

CI-E 2.0x16 Slots for
MD CrossFireX or
al Graphics Support

SNR by ALC889 Audio Codec

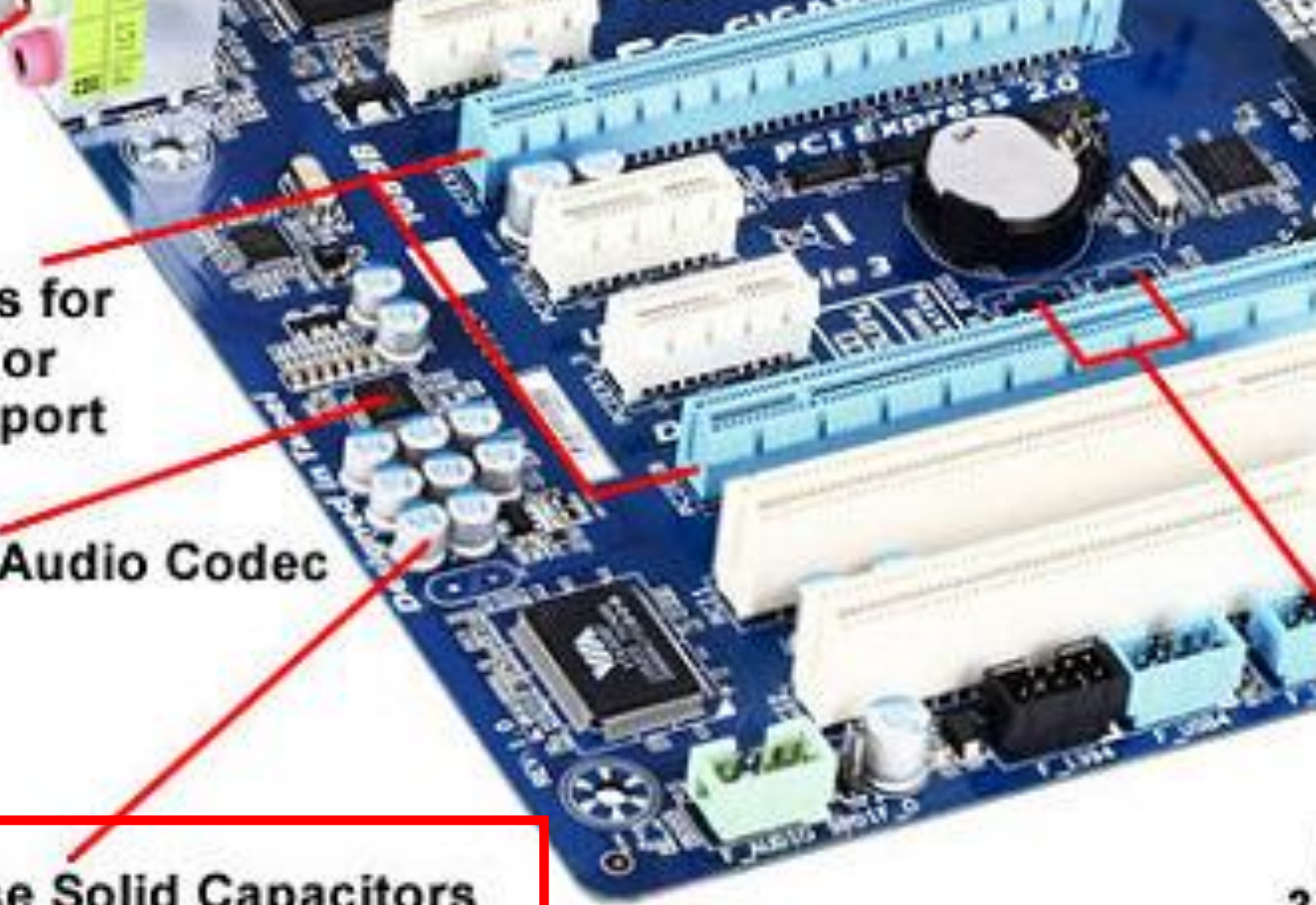
eSATA3 Port

8ch Audio with
Dolby Home Theater

2*PCI-E 2.0x16 Slots for
AMD CrossFireX or
Dual Graphics Support

108dB SNR by ALC889 Audio Codec

All Japanese Solid Capacitors



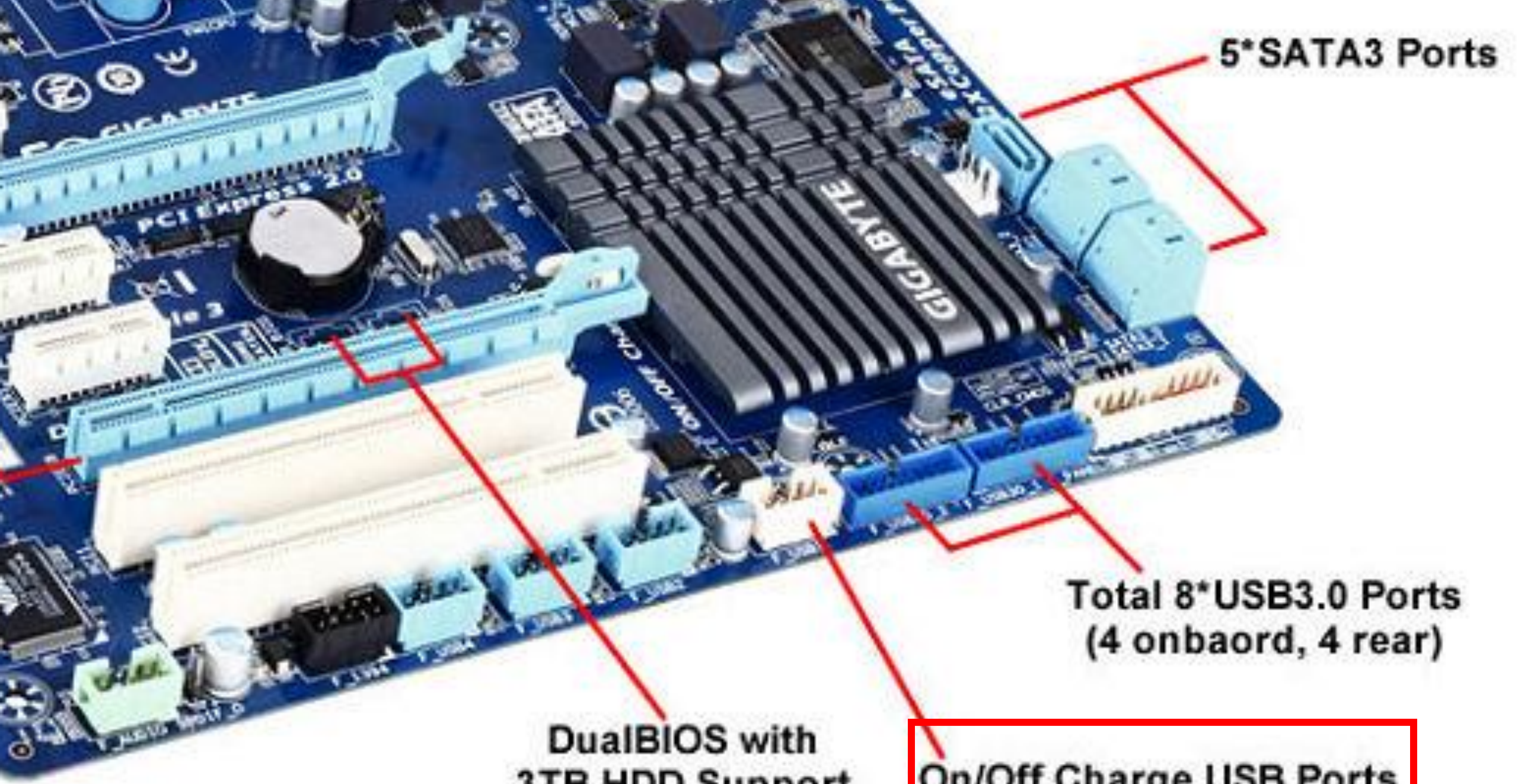
3 Port

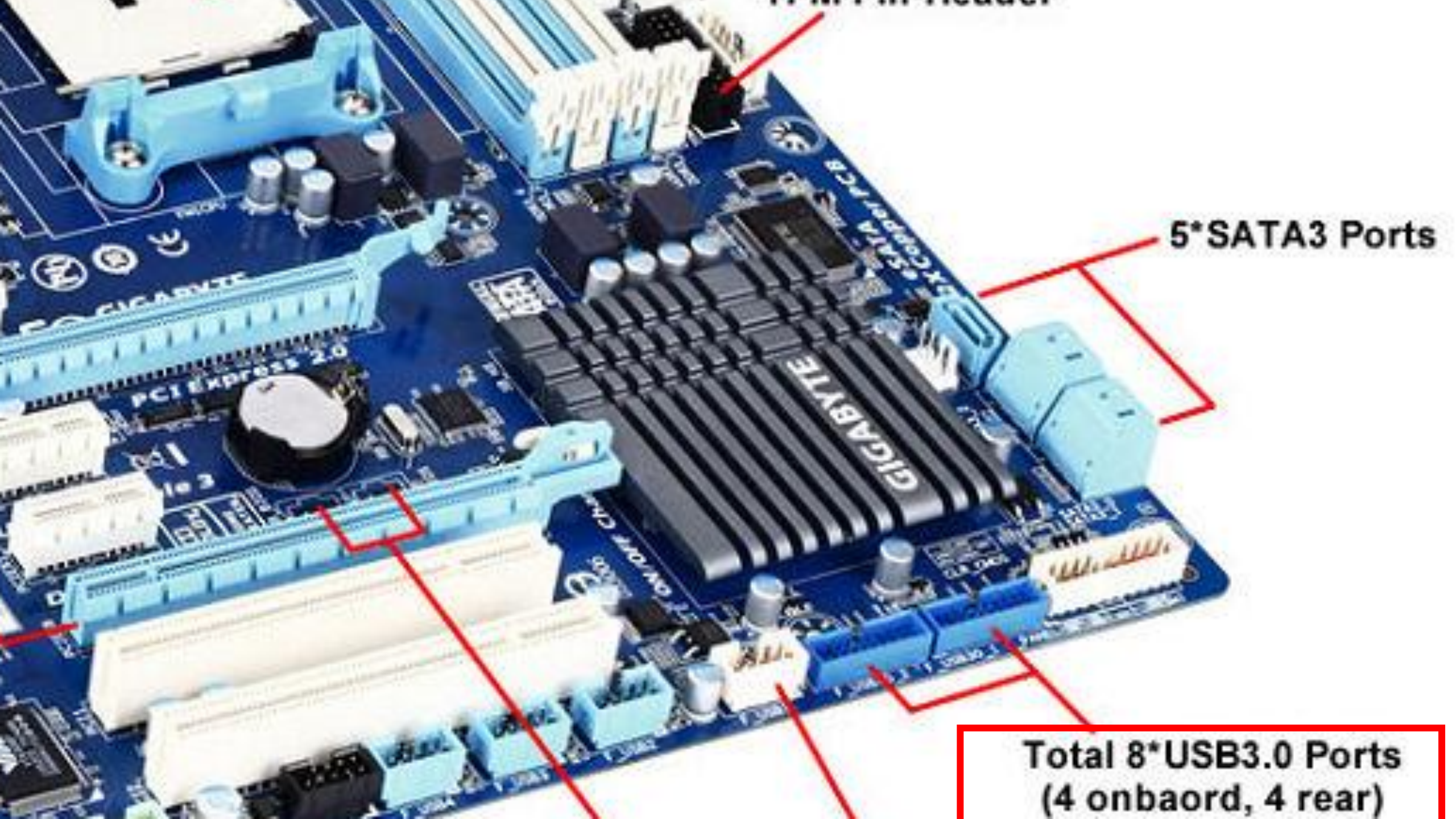
o with
e Theater

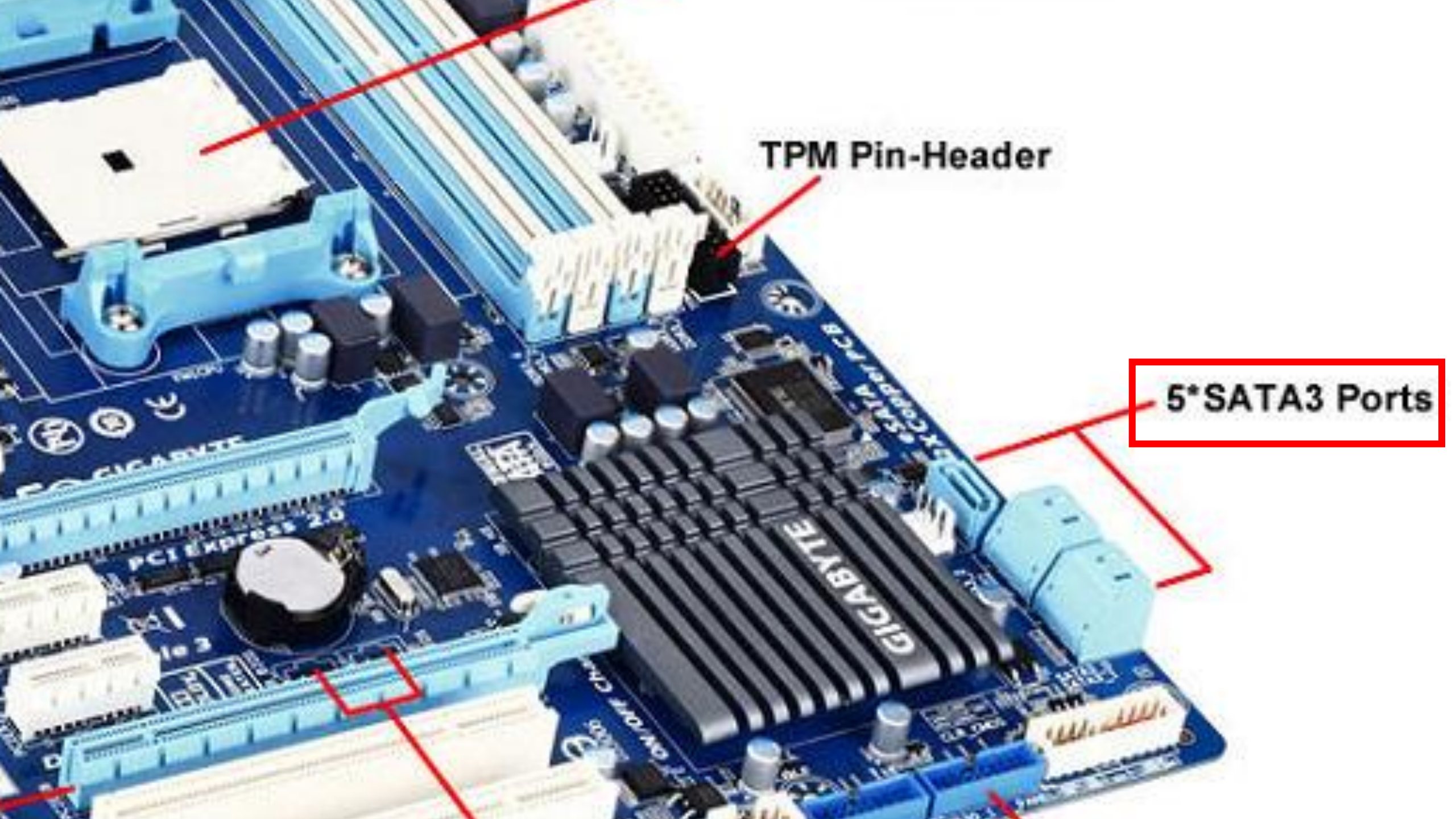
E 2.0x16 Slots for
CrossFireX or
Graphics Support

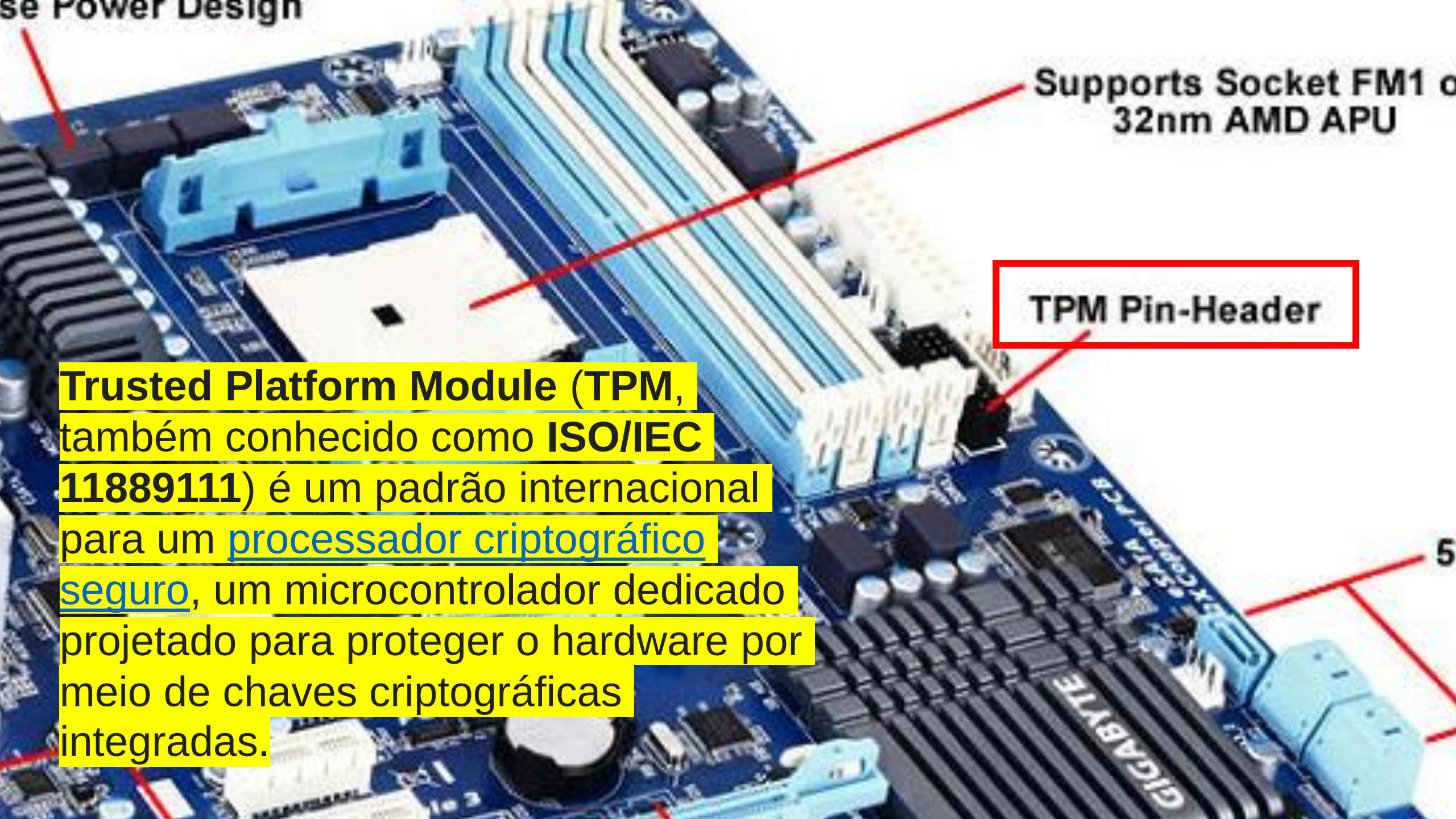
R by ALC889 Audio Codec


or
ort
udio Codec
Solid Capacitors
DualBIOS with
3TB HDD Support
On/Off Cha
Tot
(4

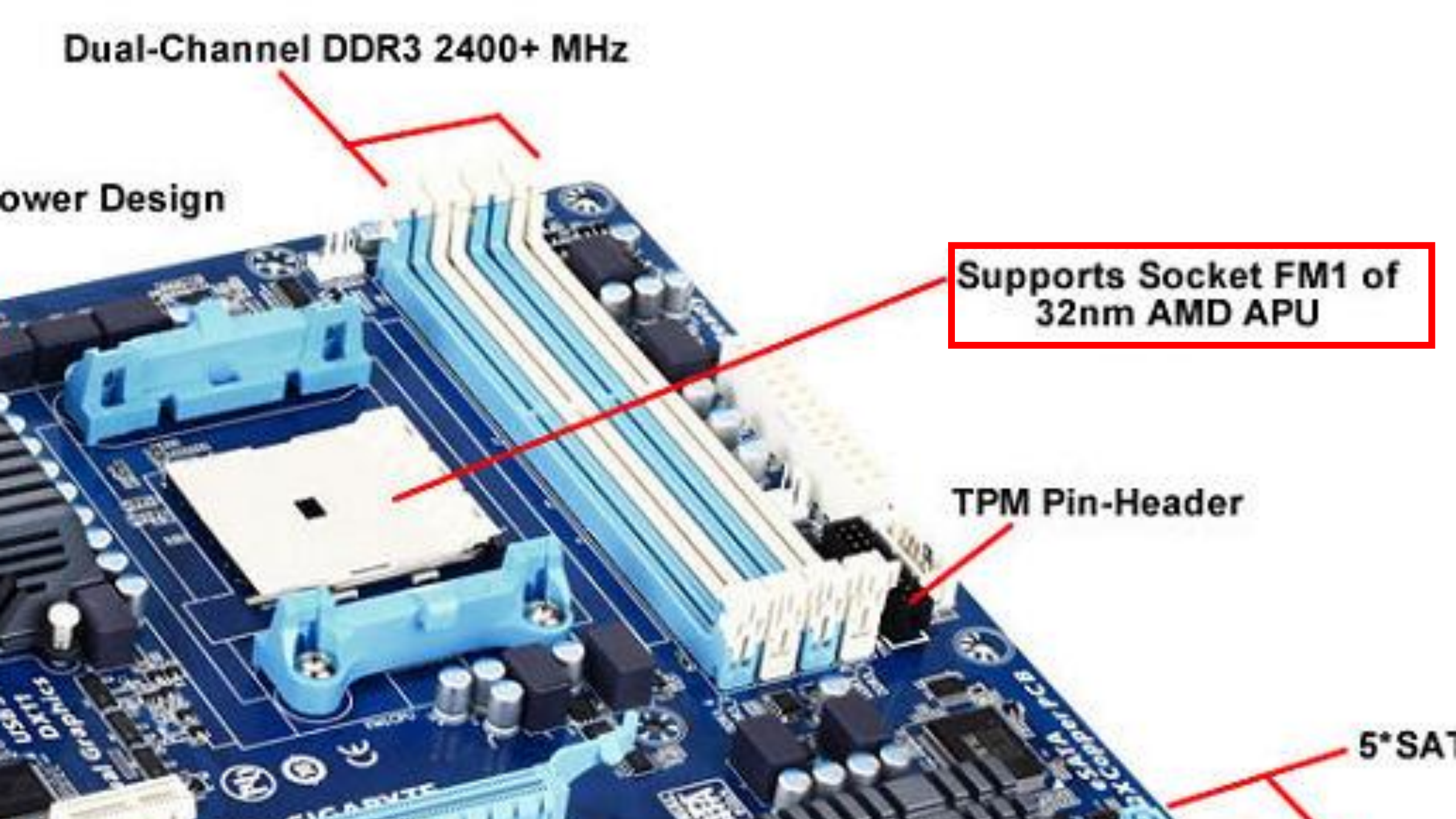

5*SATA3 Ports
Total 8*USB3.0 Ports
(4 onbaord, 4 rear)
DualBIOS with
3TB HDD Support
On/Off Charge USB Ports

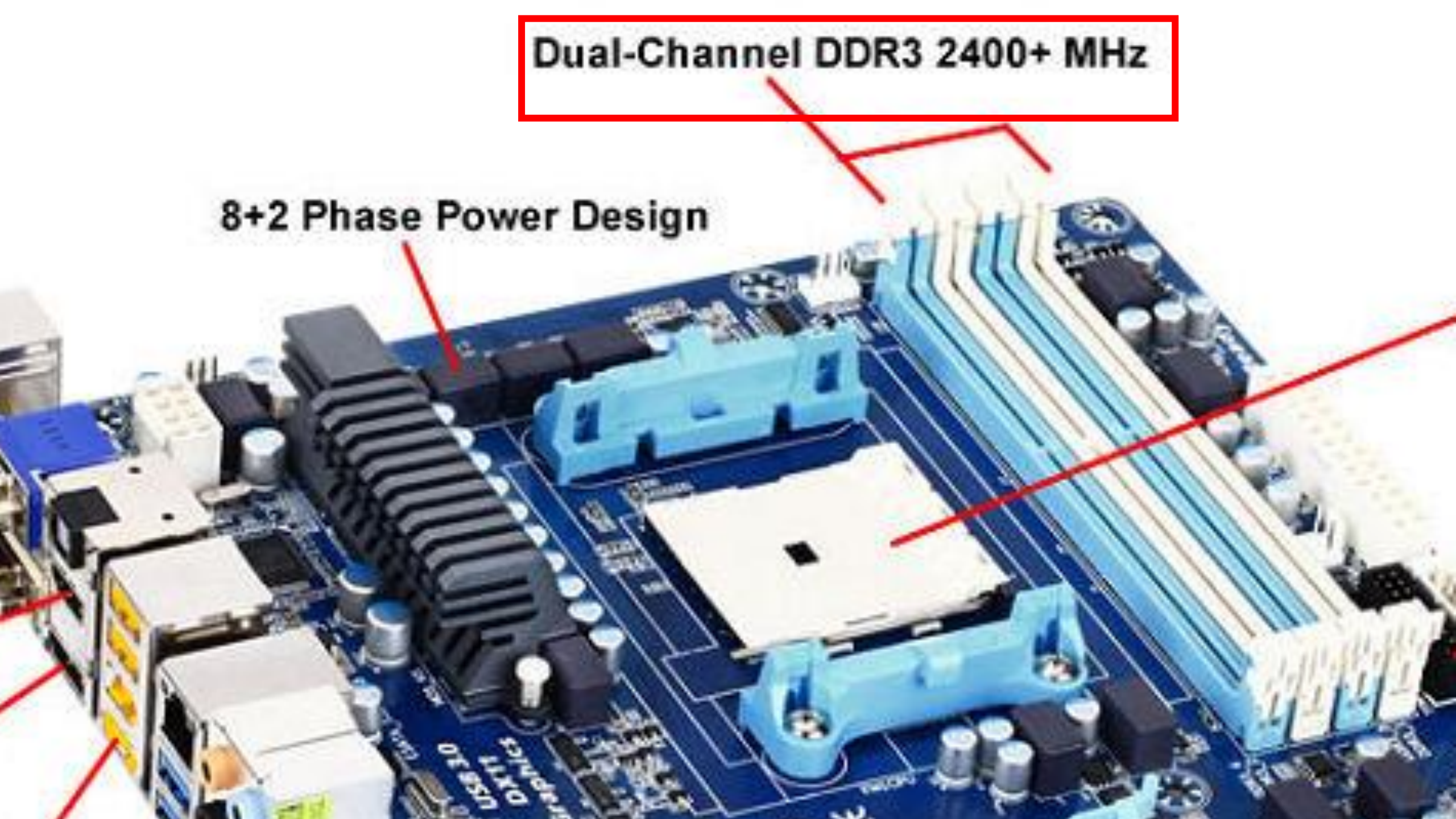

5*SATA3 Ports
Total 8*USB3.0 Ports
(4 onbaord, 4 rear)

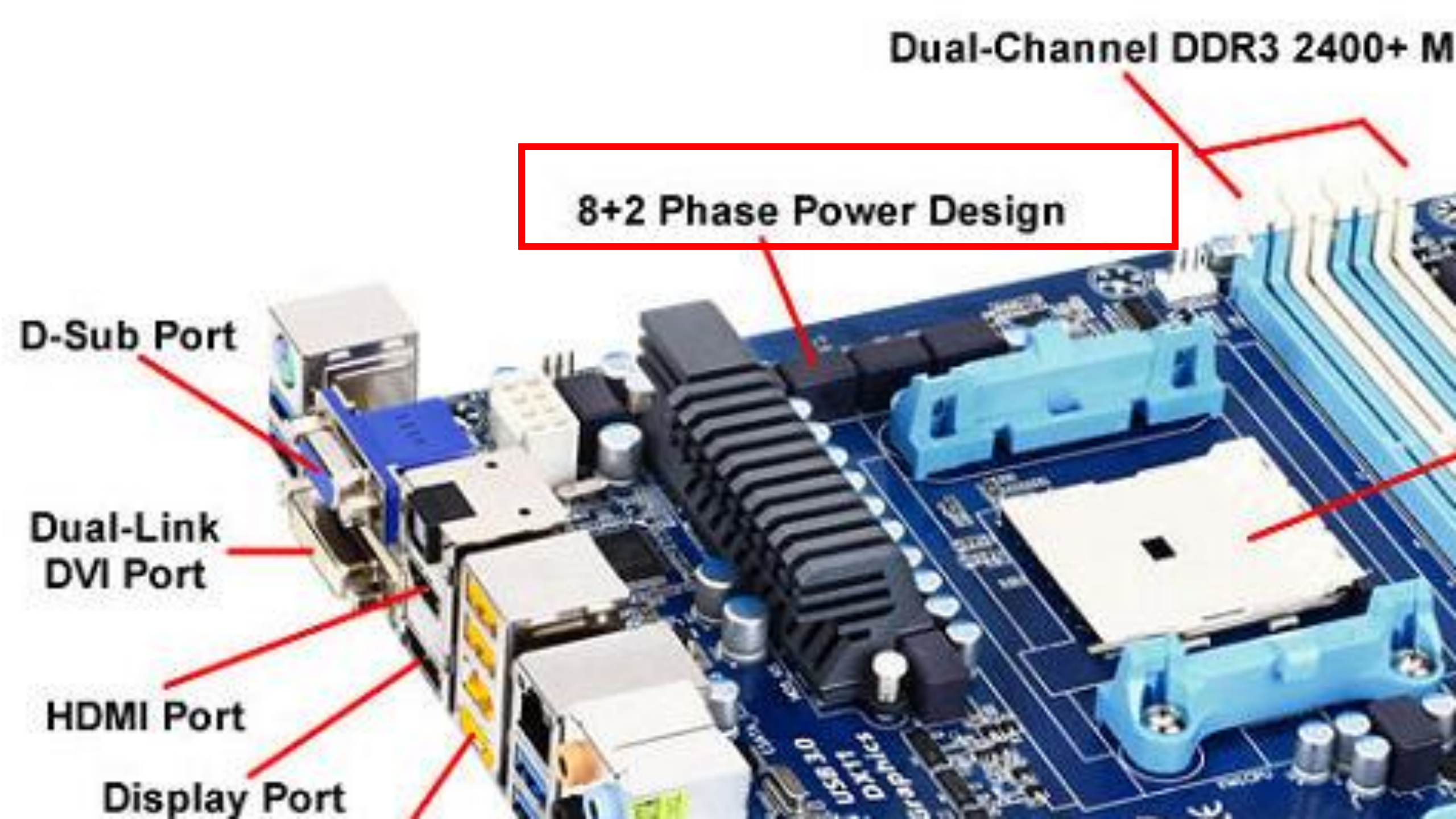

TPM Pin-Header
5*SATA3 Ports



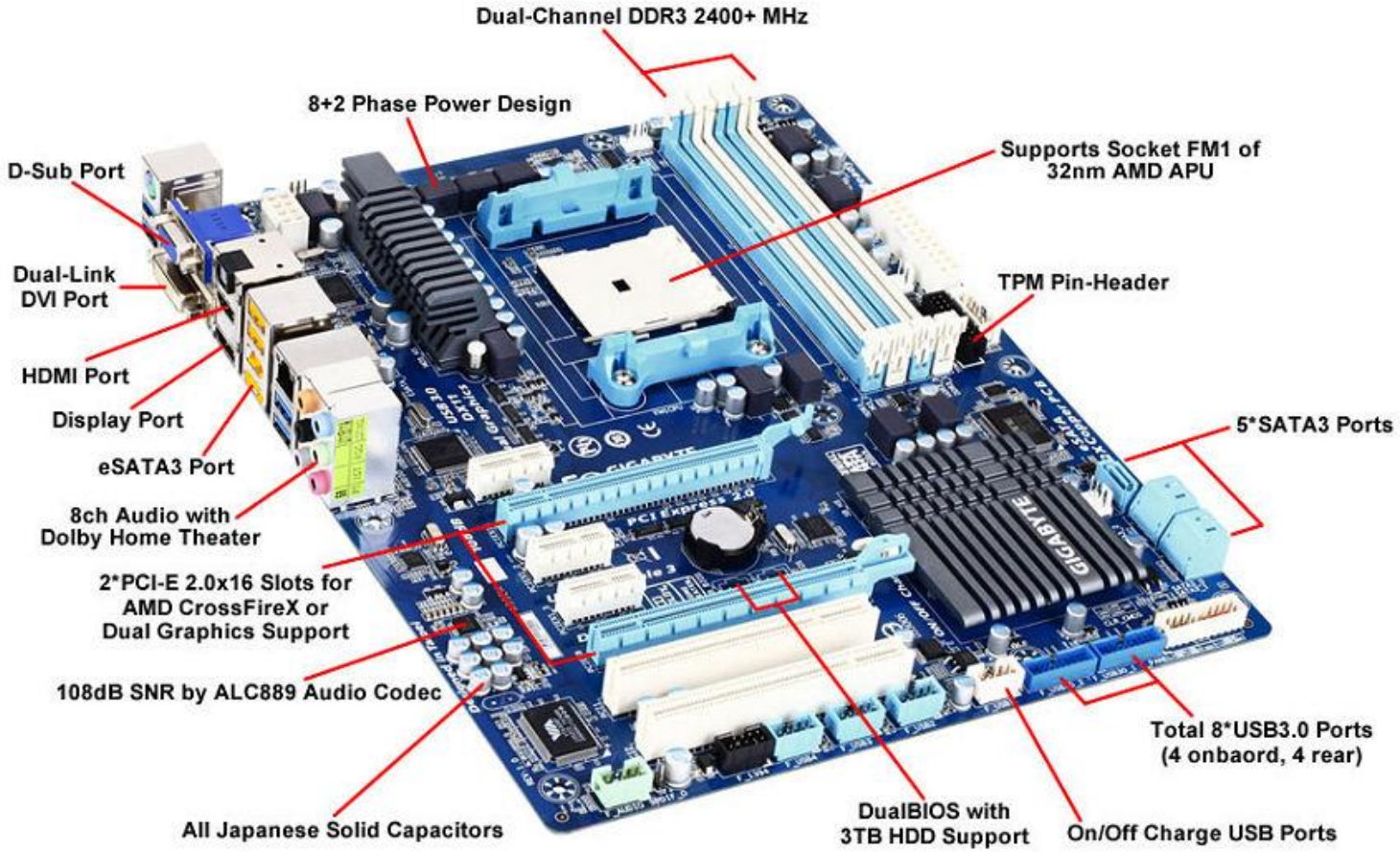

**Trusted Platform Module** (**TPM**, também conhecido como **ISO/IEC 11889111**) é um padrão internacional para um processador criptográfico seguro, um microcontrolador dedicado projetado para proteger o hardware por meio de chaves criptográficas integradas.

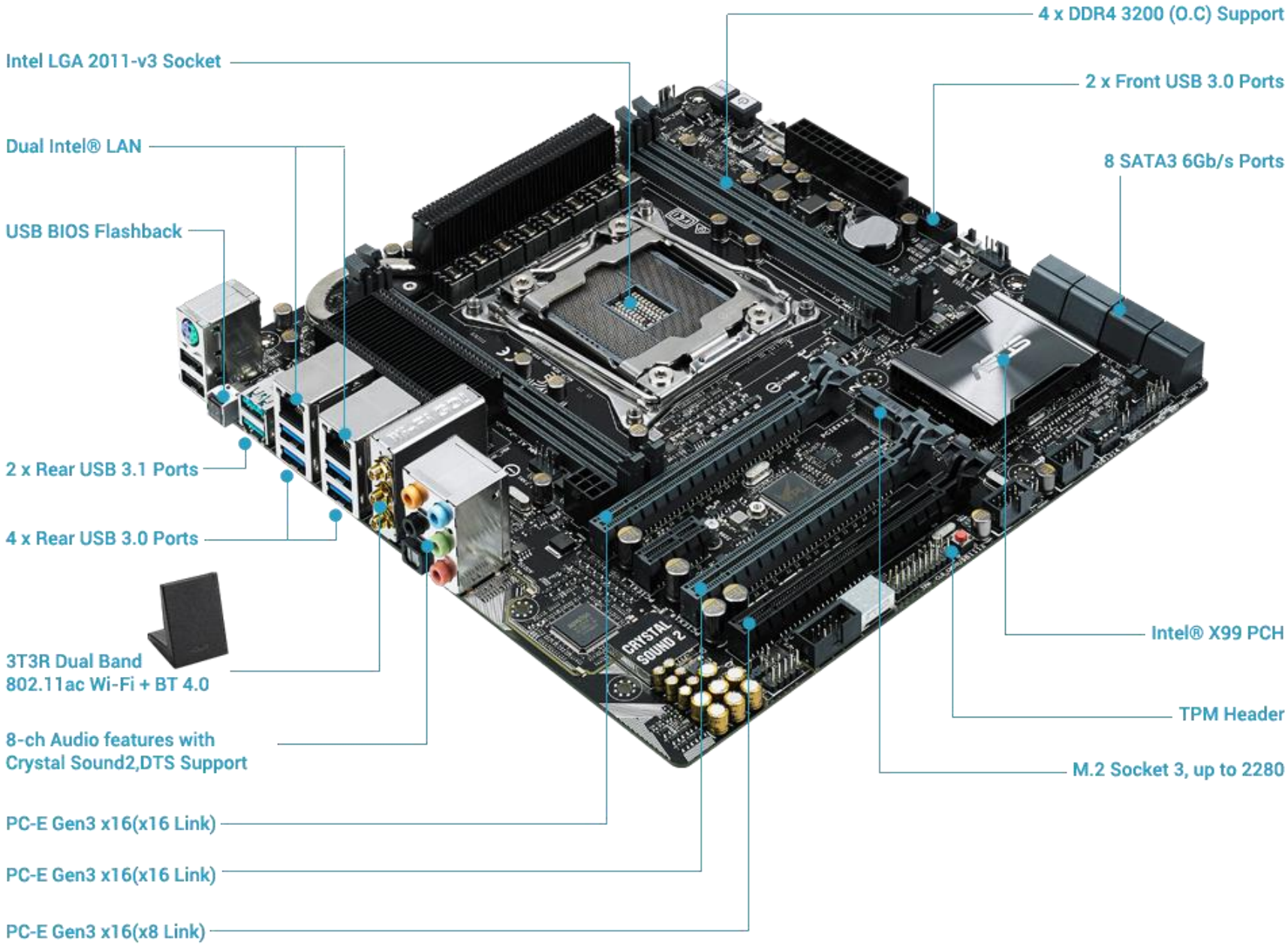

Dual-Channel DDR3 2400+ MHz
ower Design
Supports Socket FM1 of 32nm AMD APU
TPM Pin-Header
5*SAT


Dual-Channel DDR3 2400+ MHz
8+2 Phase Power Design

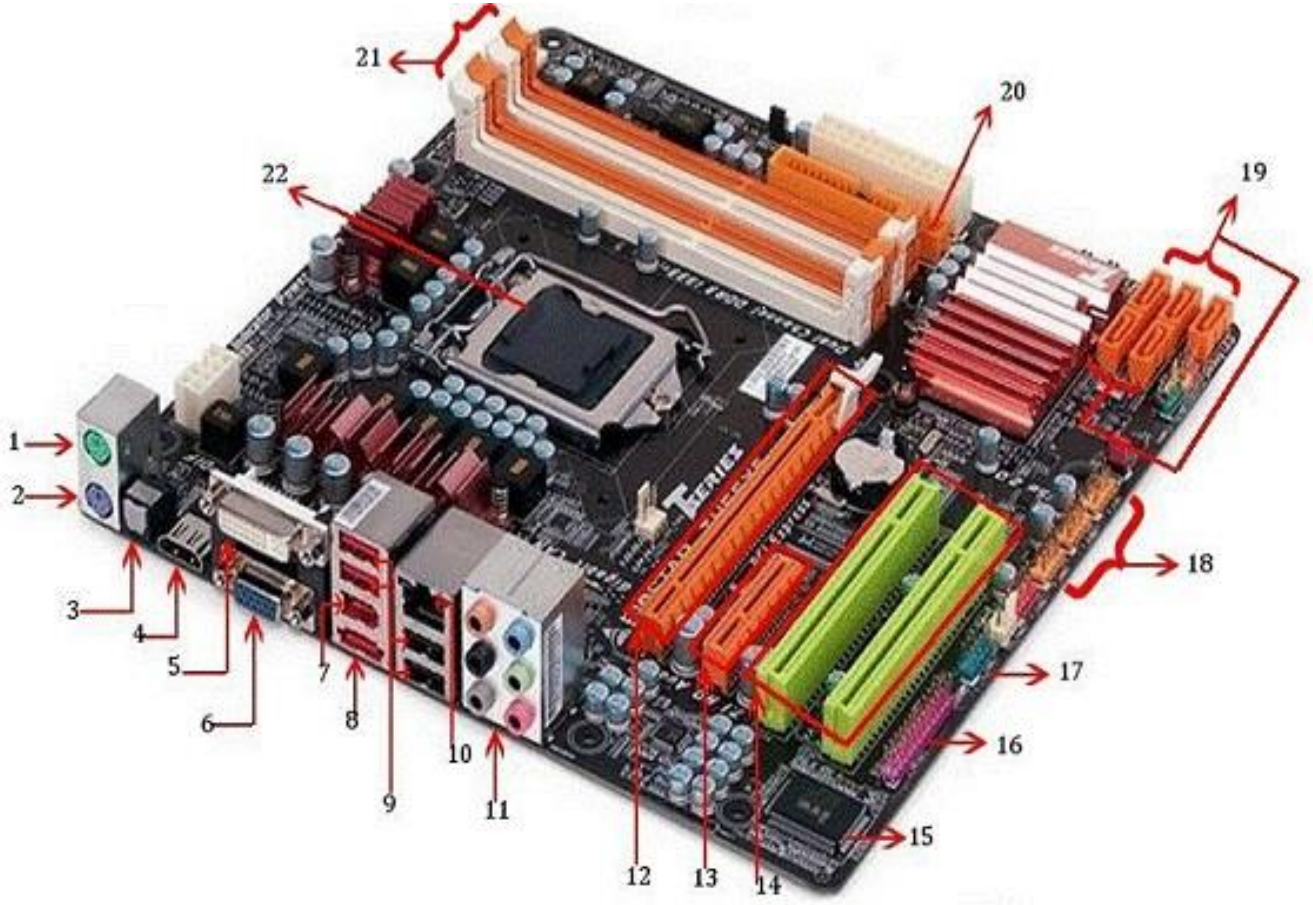

Dual-Channel DDR3 2400+ M
8+2 Phase Power Design
D-Sub Port
Dual-Link
DVI Port
HDMI Port
Display Port

# Componentes




Intel LGA 2011-v3 Socket
Dual Intel® LAN
USB BIOS Flashback
2 x Rear USB 3.1 Ports
4 x Rear USB 3.0 Ports
3T3R Dual Band
802.11ac Wi-Fi + BT 4.0
8-ch Audio features with
Crystal Sound2,DTS Support
PC-E Gen3 x16(x16 Link)
PC-E Gen3 x16(x16 Link)
PC-E Gen3 x16(x8 Link)
4 x DDR4 3200 (O.C) Support
2 x Front USB 3.0 Ports
8 SATA3 6Gb/s Ports
Intel® X99 PCH
TPM Header
M.2 Socket 3, up to 2280
CRYSTAL SOUND 2

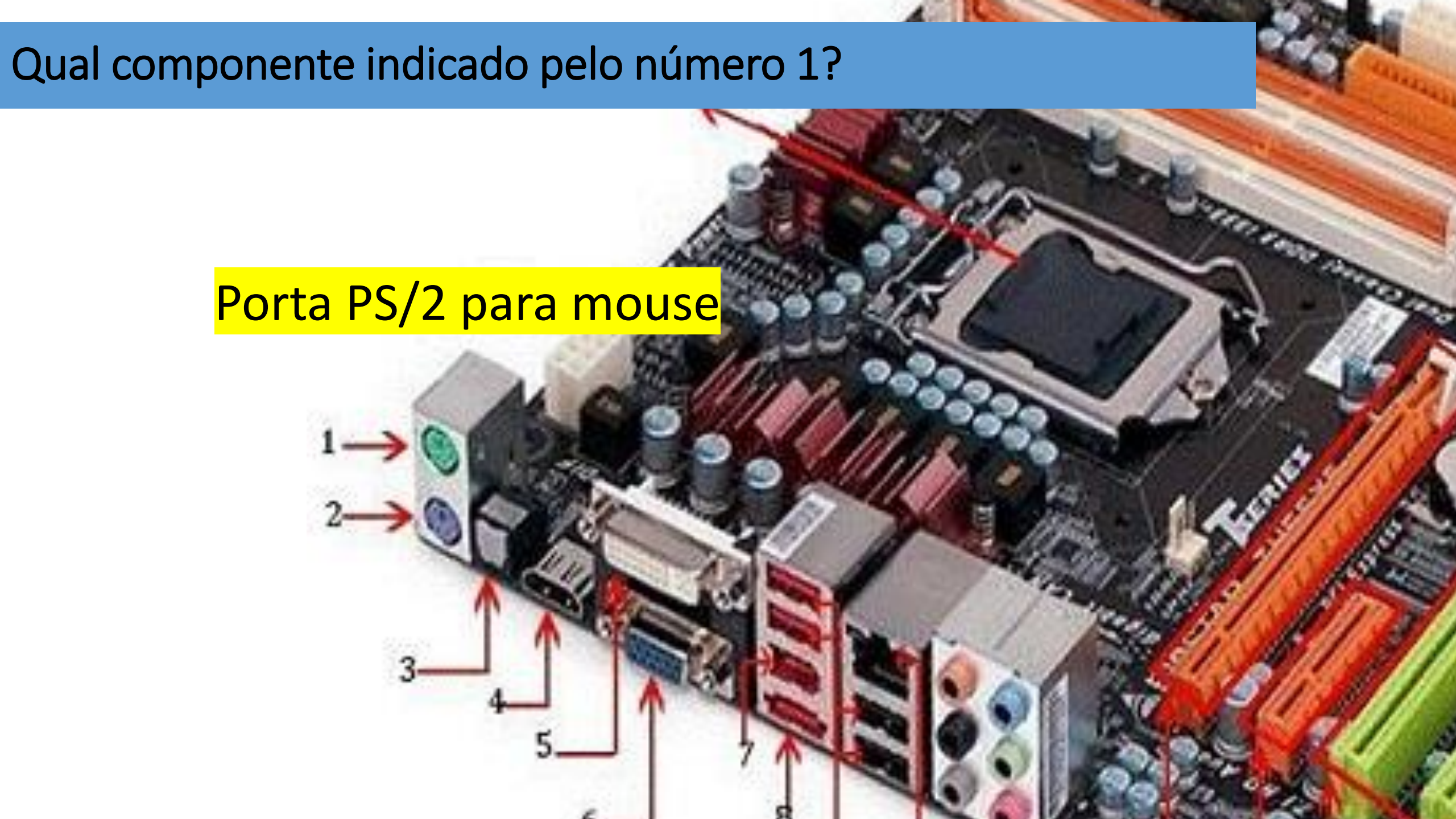
# Vamos estudar!



# Qual componente indicado pelo número 1?

# Qual componente indicado pelo número 1?

Porta PS/2 para mouse



# Qual componente indicado pelo número 2?

# Qual componente indicado pelo número 2?


Porta PS/2 para teclado

# Qual componente indicado pelo número 3?

# Qual componente indicado pelo número 3?


Saída de áudio digital (SPDIF)

# Qual componente indicado pelo número 4?

# Qual componente indicado pelo número 4?


Conector de vídeo HDMI

# Qual componente indicado pelo número 5?

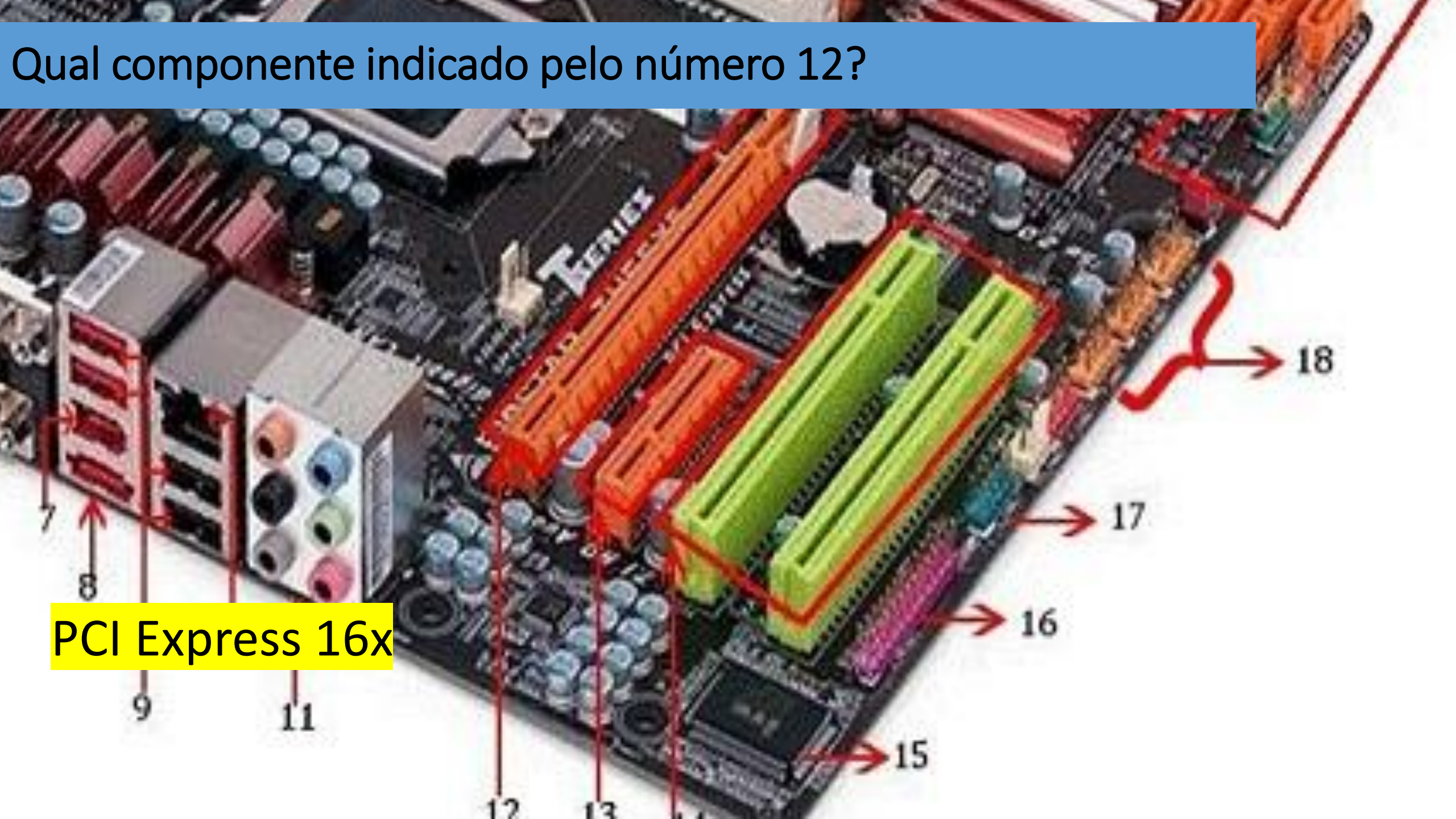
# Qual componente indicado pelo número 5?

# Qual componente indicado pelo número 6?

# Qual componente indicado pelo número 6?

# Qual componente indicado pelo número 12?

# Qual componente indicado pelo número 12?



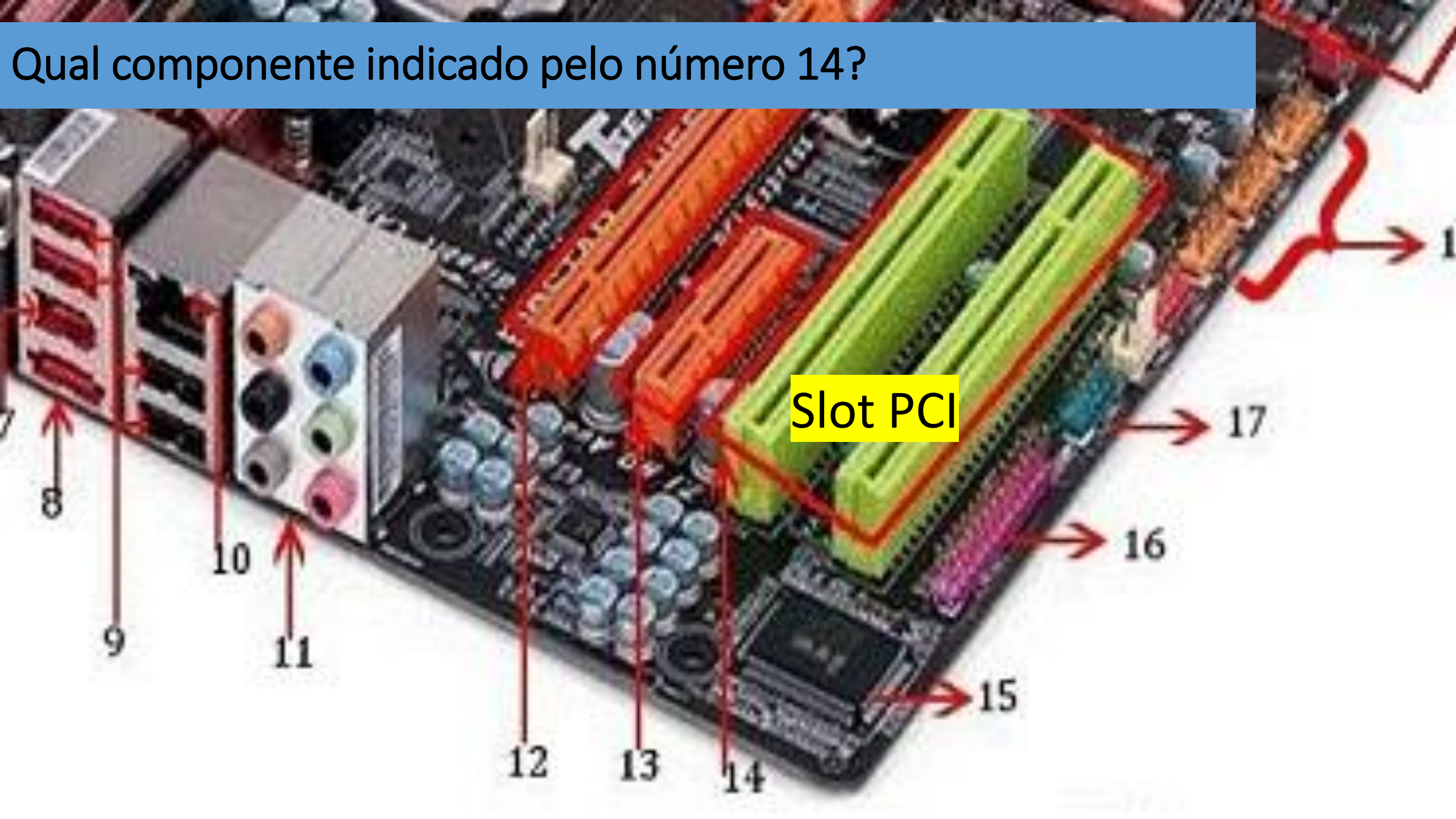

PCI Express 16x

# Qual componente indicado pelo número 13?

# Qual componente indicado pelo número 13?

# Qual componente indicado pelo número 14?

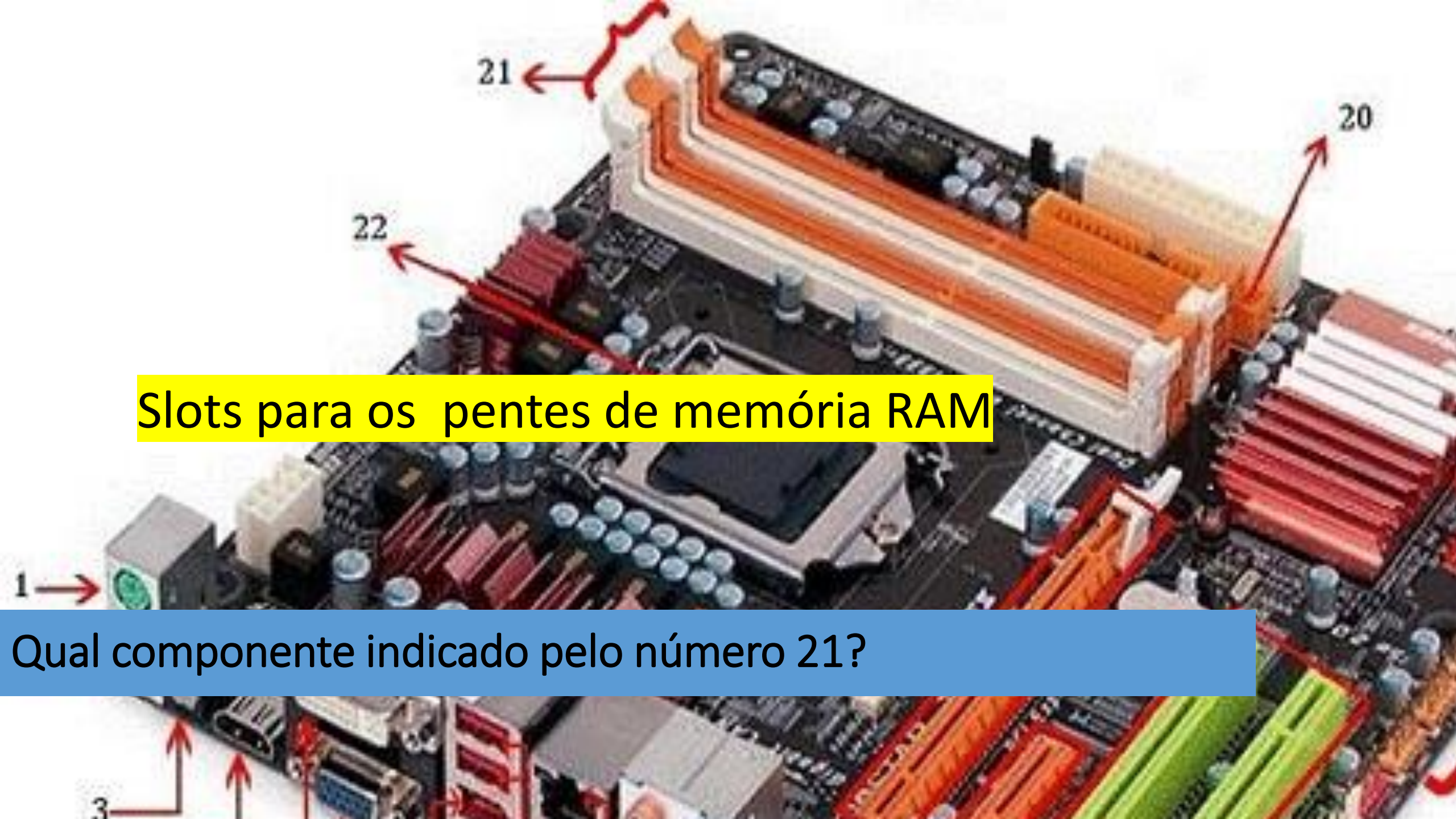
# Qual componente indicado pelo número 14?



# Qual componente indicado pelo número 19?

# Qual componente indicado pelo número 19?

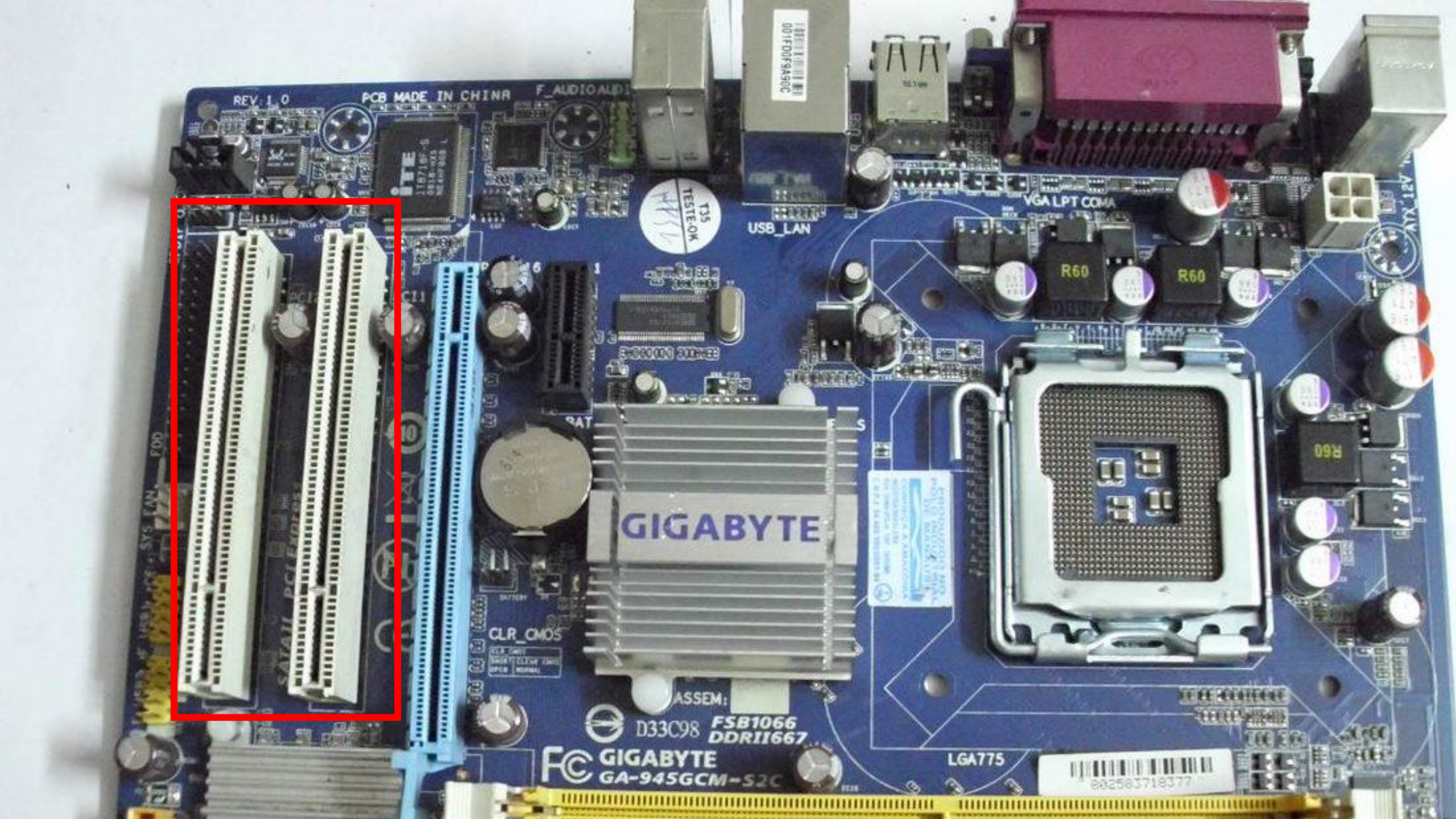

Qual componente indicado pelo número 21?

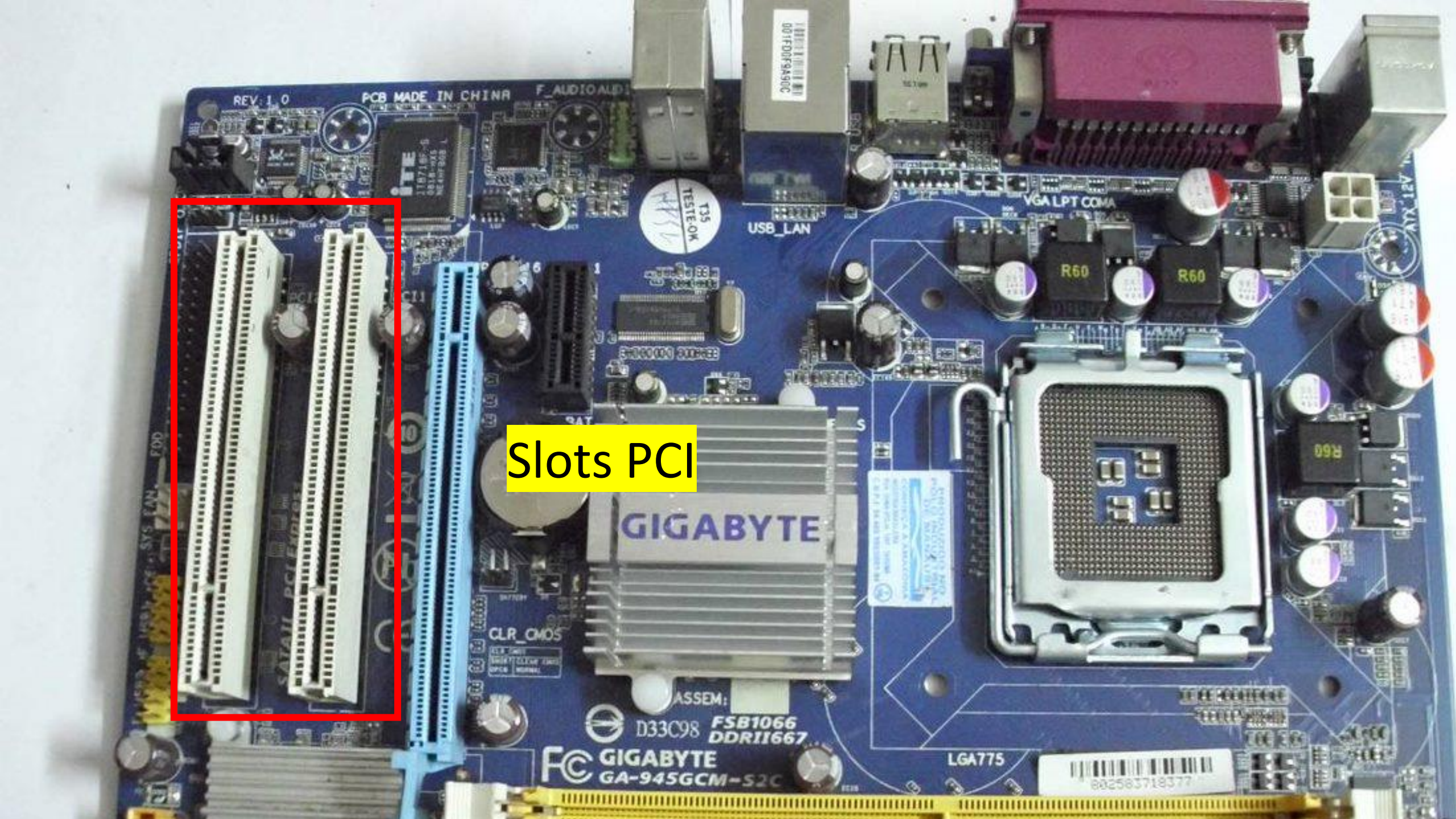


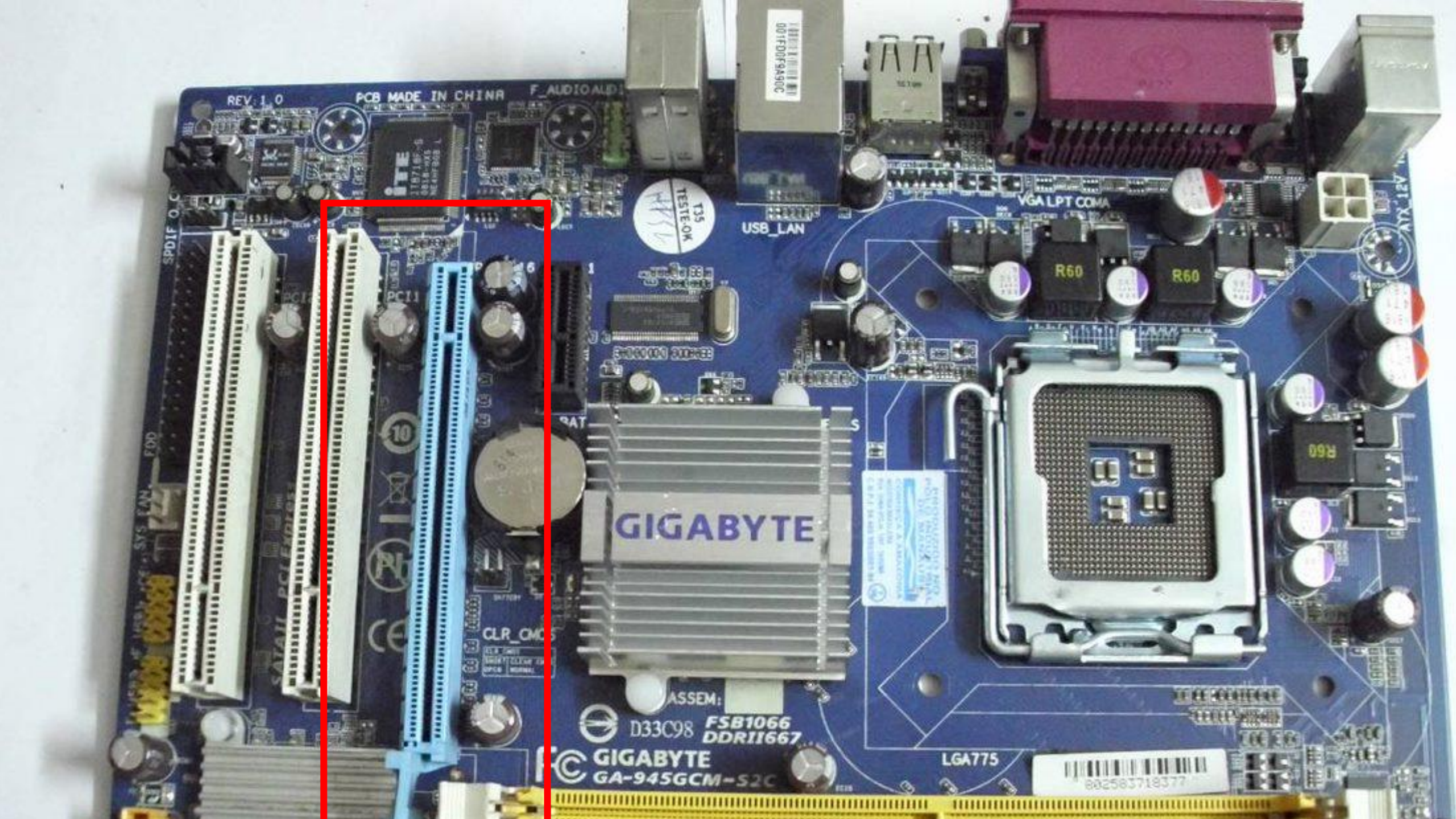

Slots para os  pentes de memória RAM

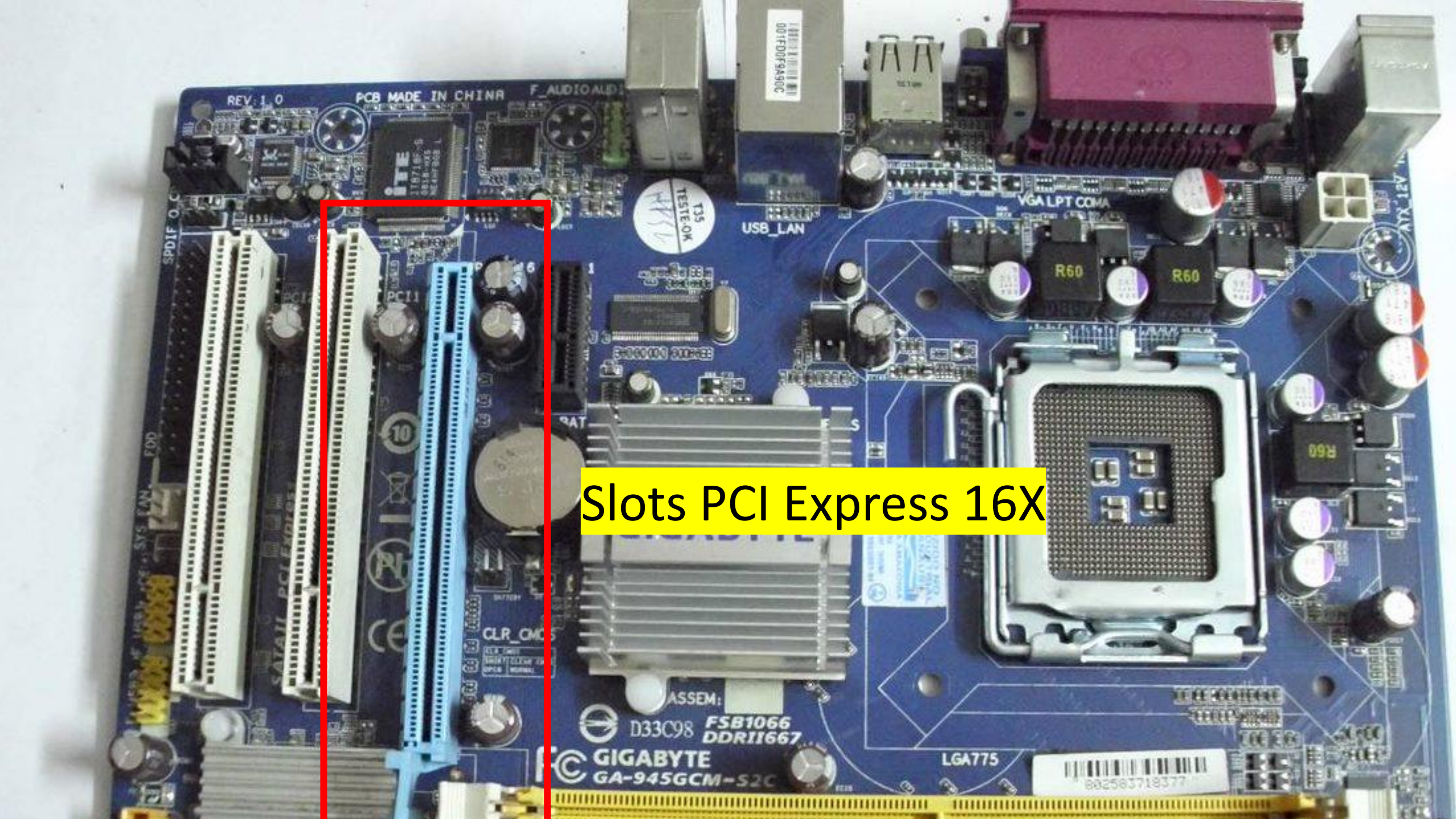
Qual componente indicado pelo número 21?

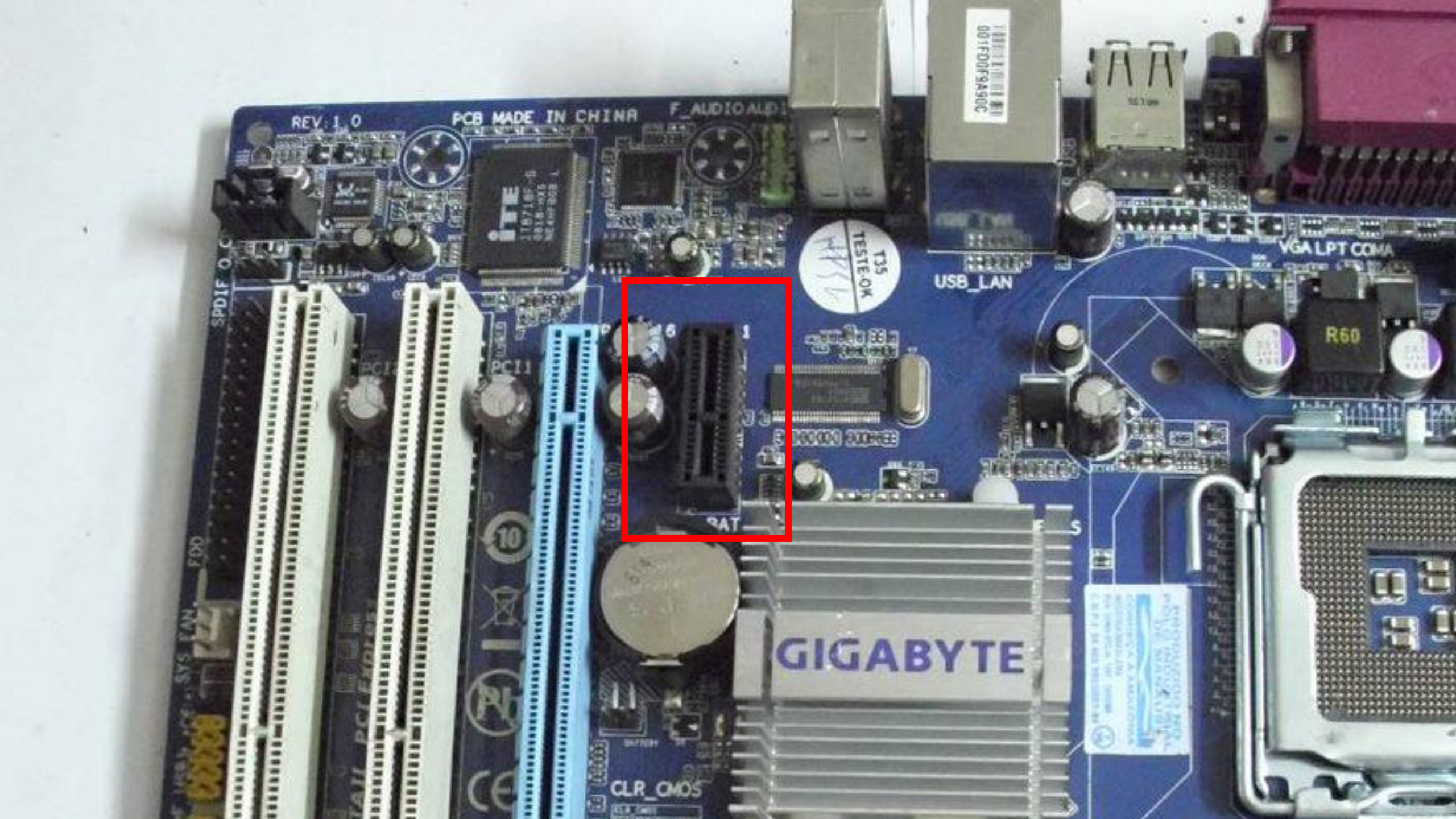
# Vamos para outra?

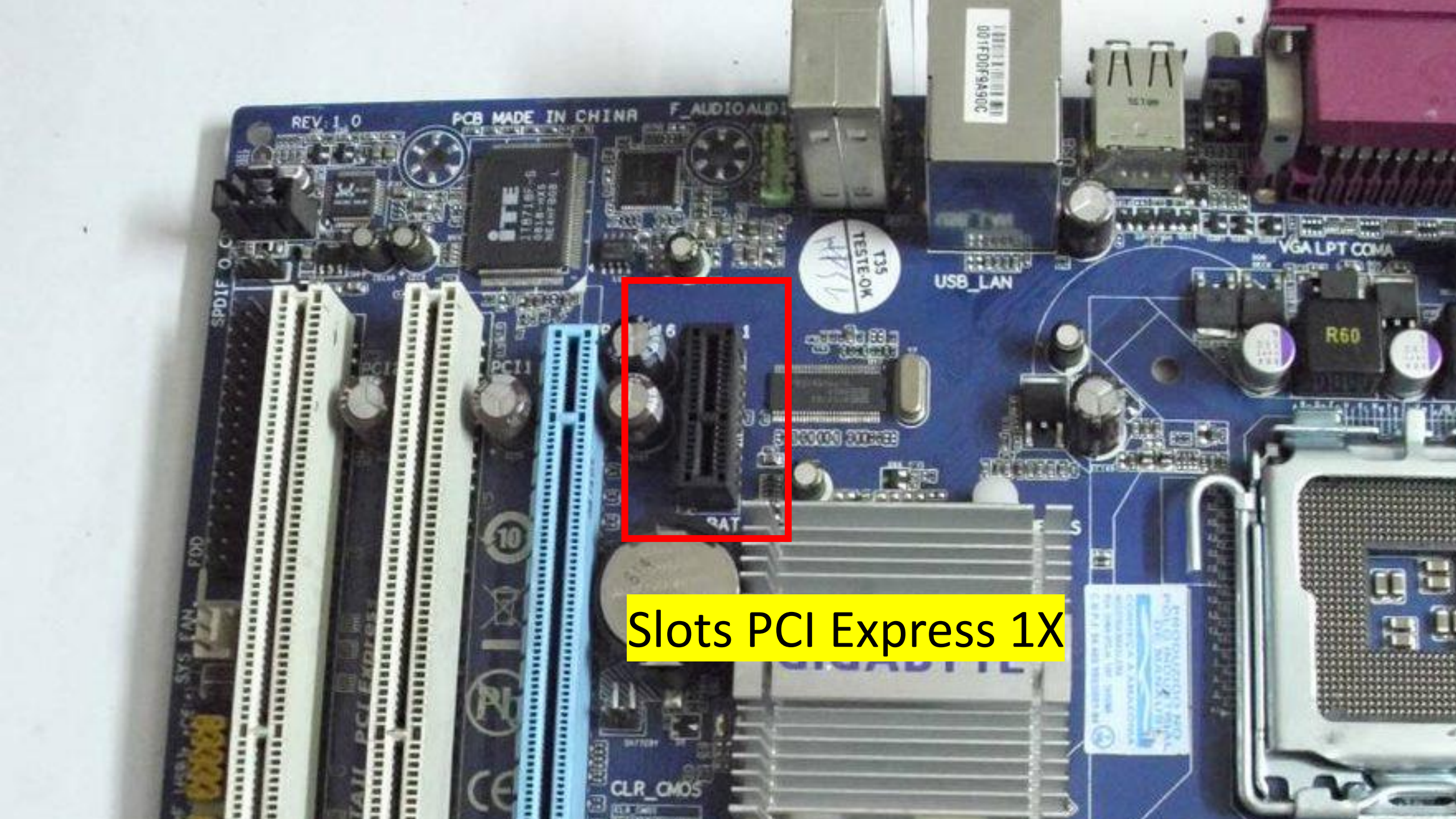

REV: 1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
R60
GIGABYTE
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775

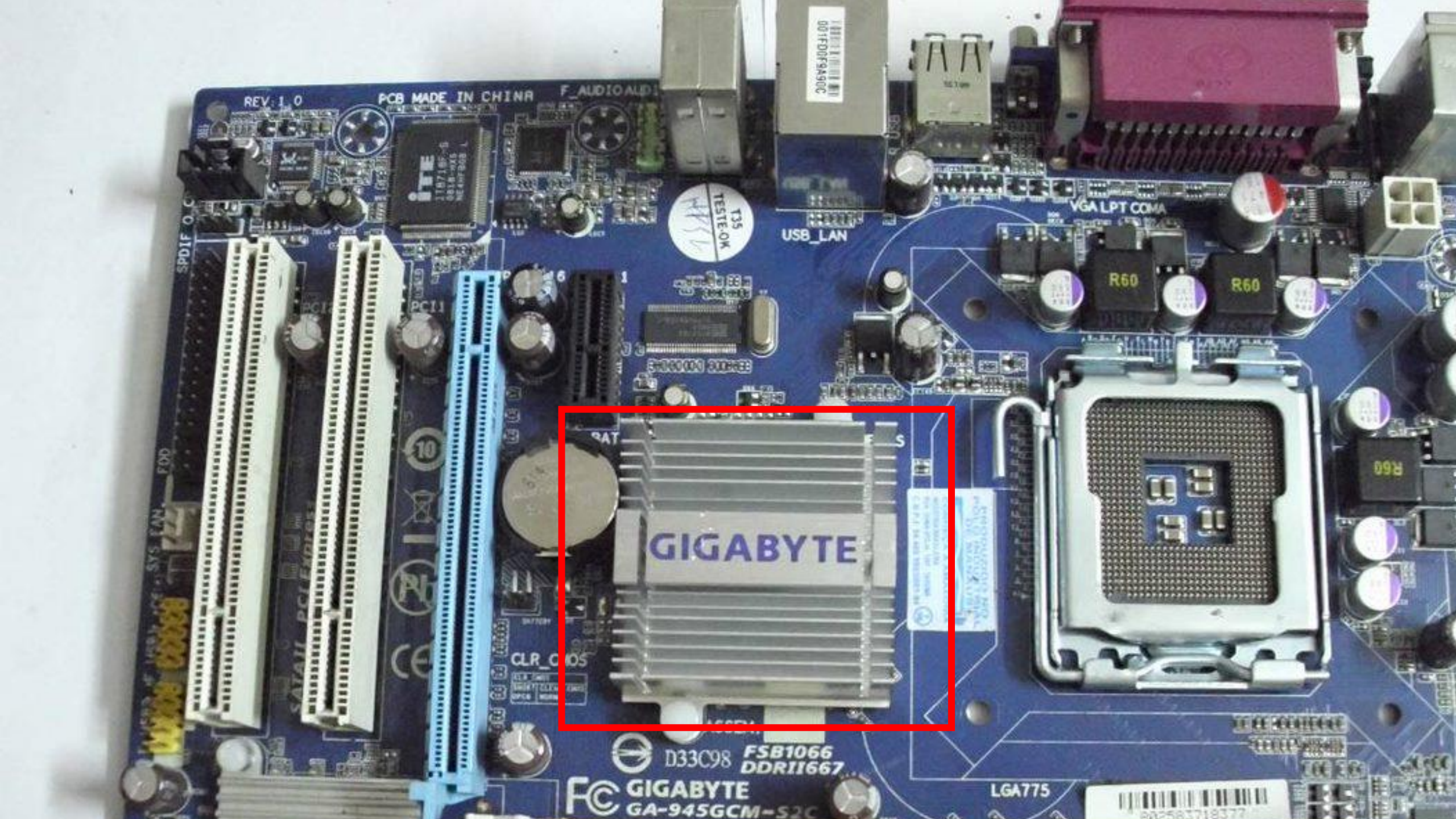

Slots PCI
REV: 1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
R60
GIGABYTE
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775

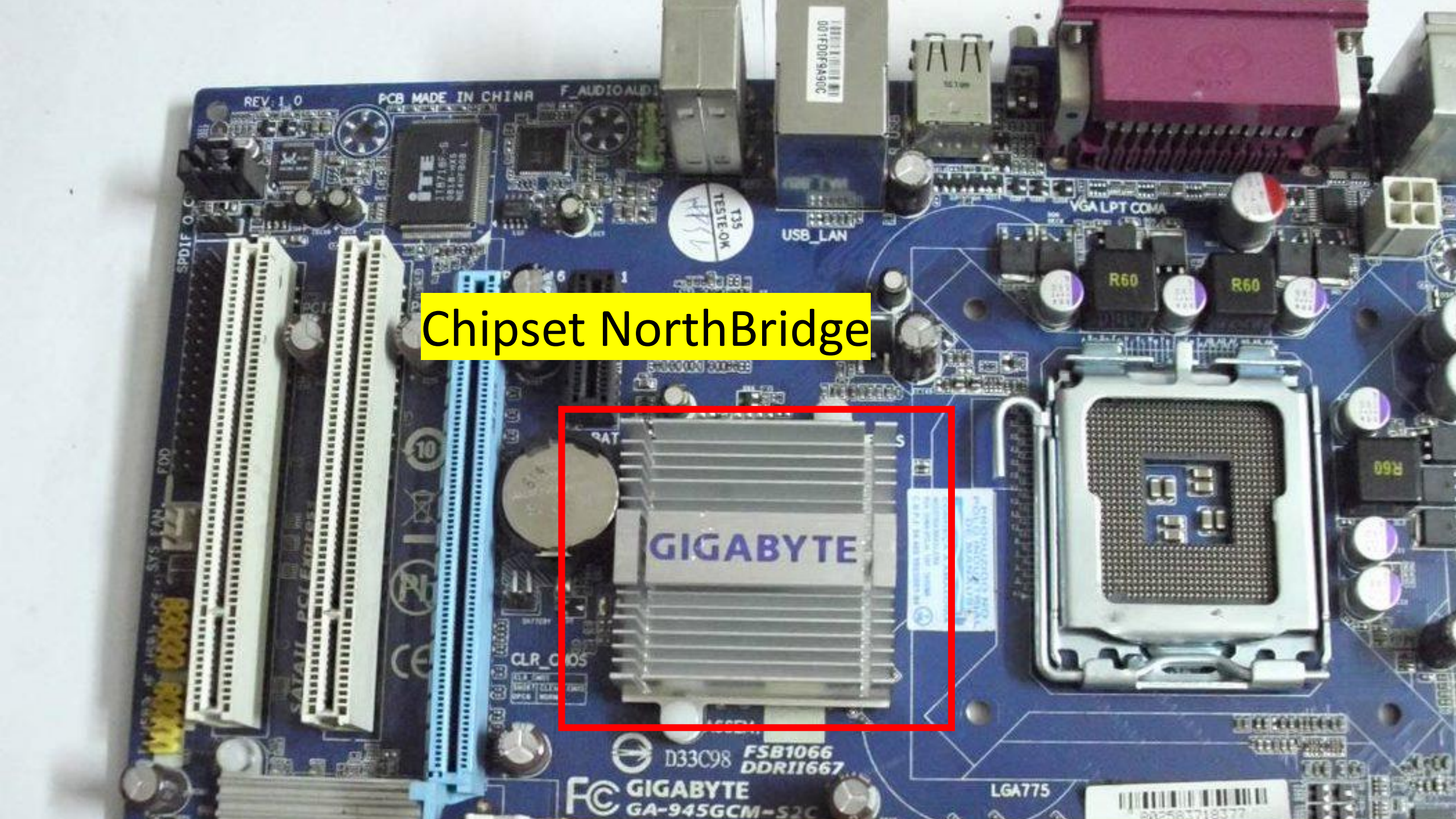

REV:1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
R60
PCI1
GIGABYTE
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775

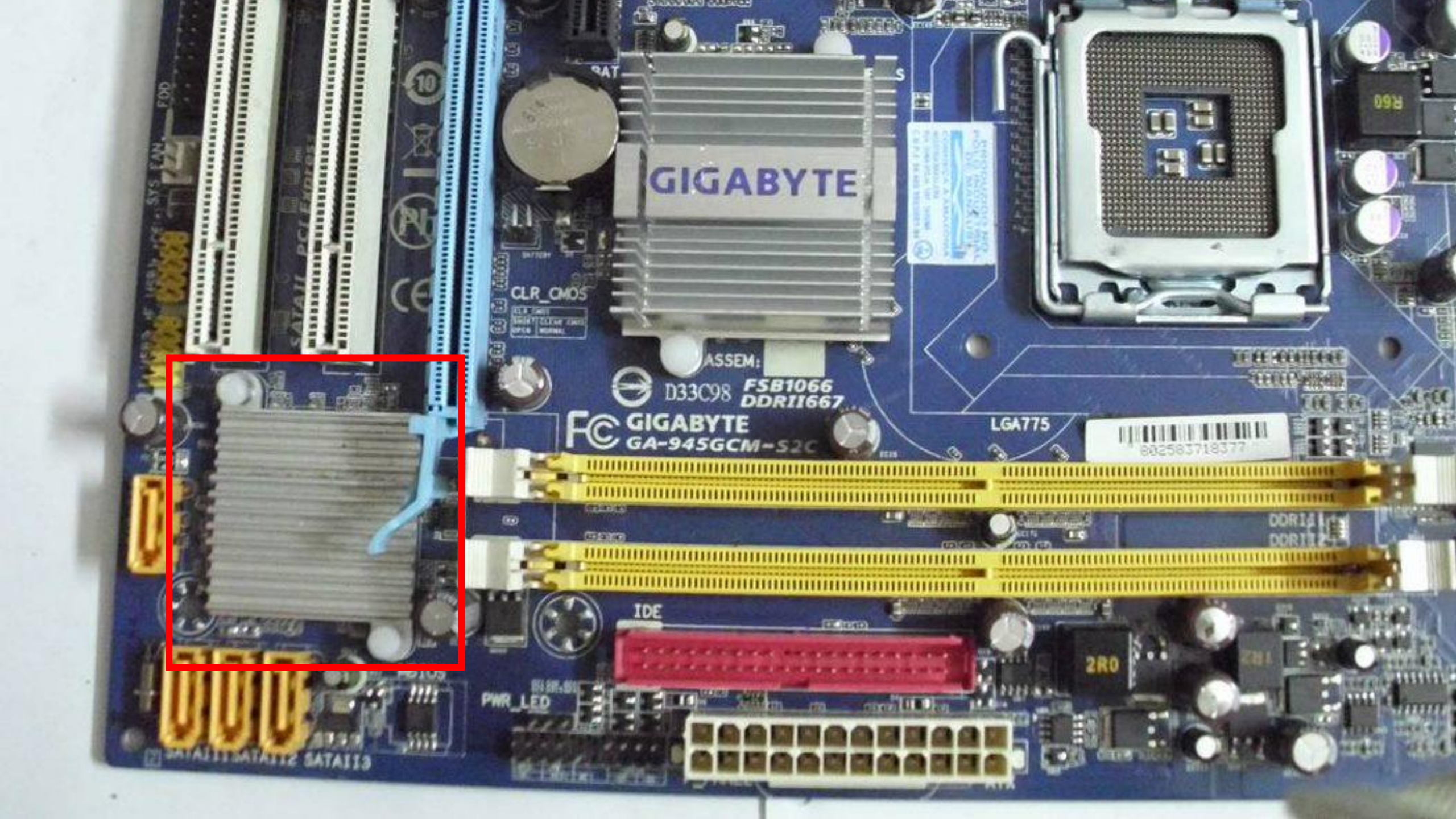

Slots PCI Express 16X
REV:1.0
PCB MADE IN CHINA
USB_LAN
VGA LPT COMA
R60
R60
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775

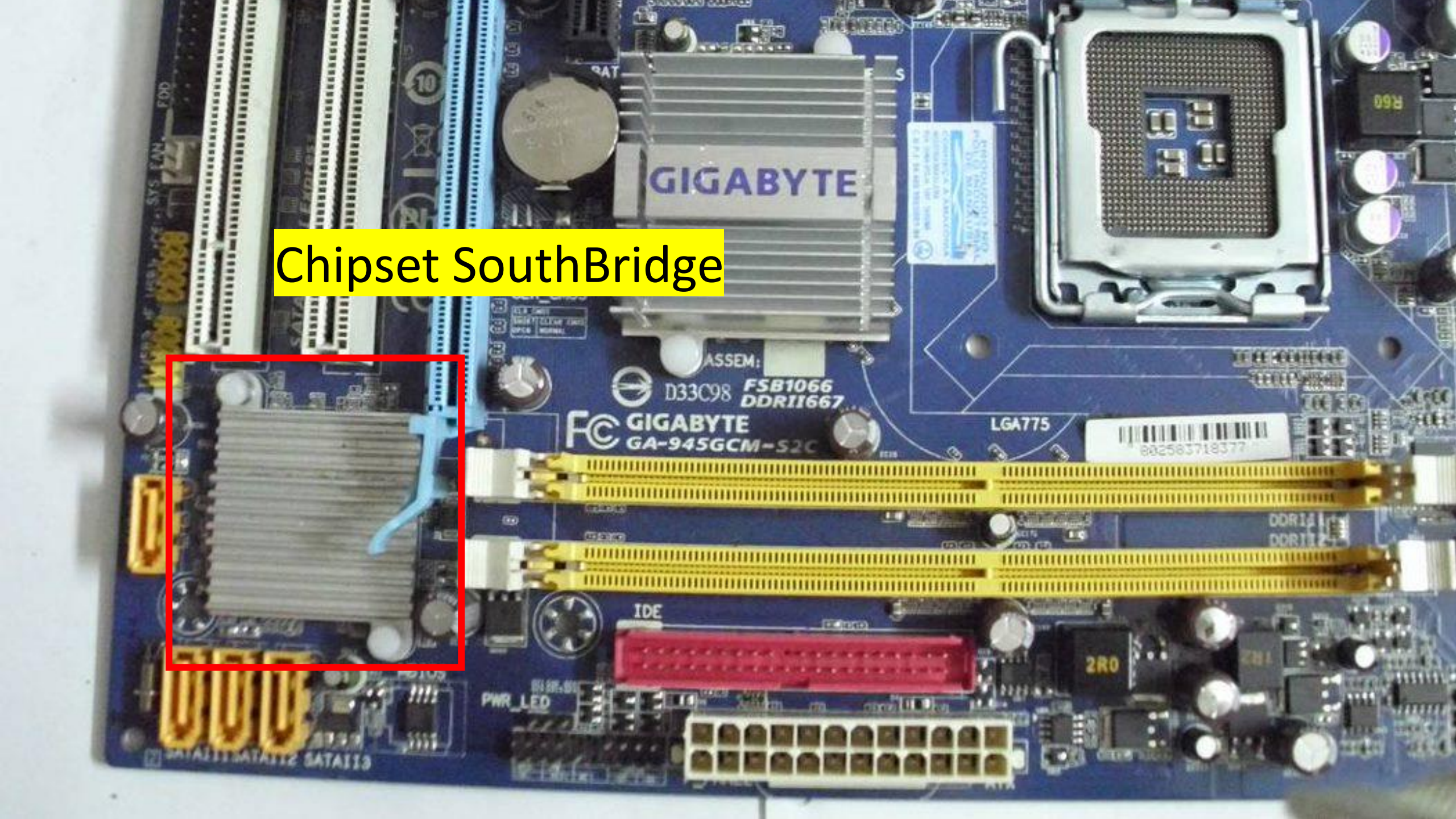

REV: 1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
BAT
CLR_CMOS
GIGABYTE
SPDIF_O
SYS_FAN
FDD

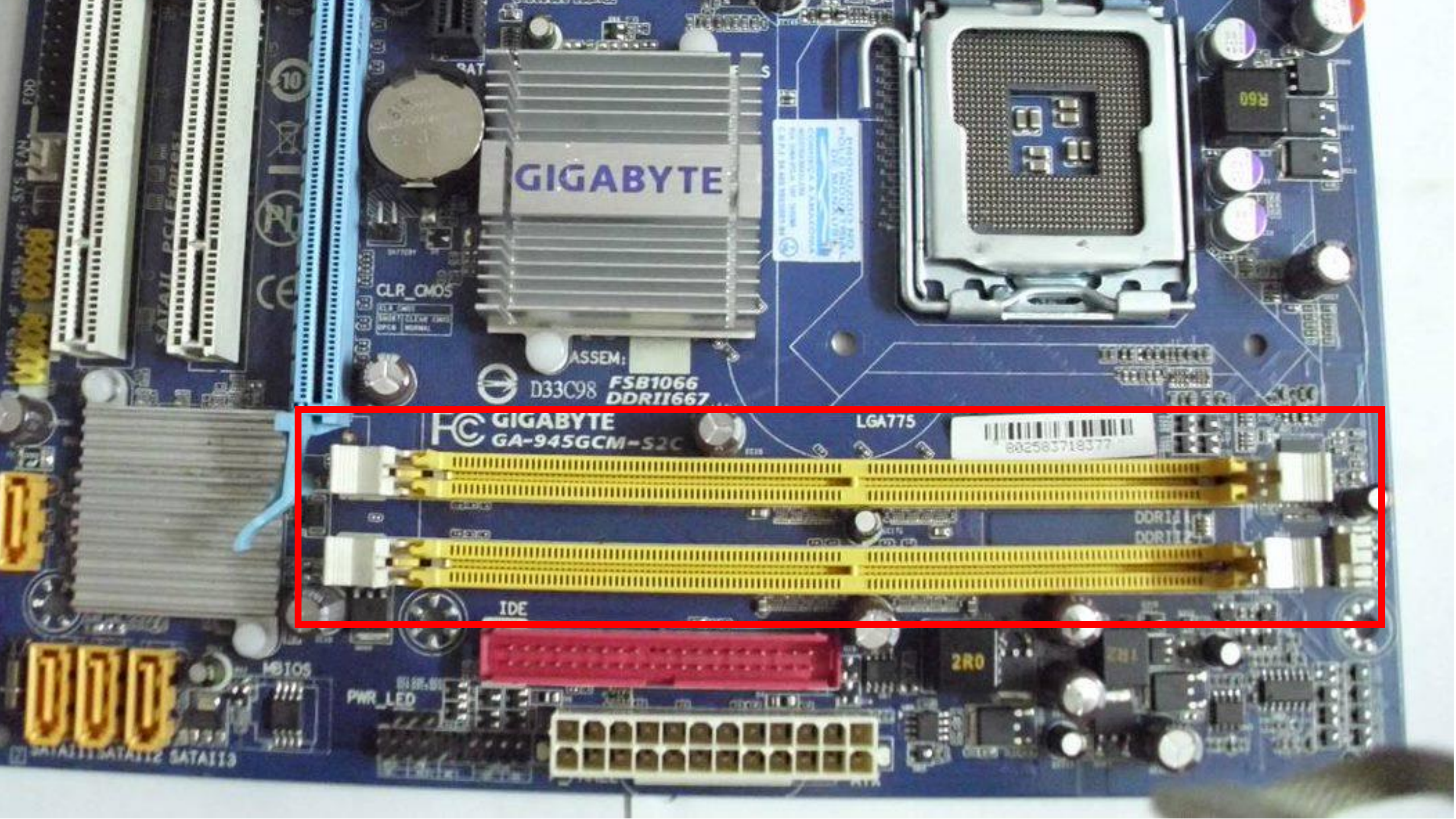

REV: 1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
SPDIF_O
PCI1
BAT
CLR_CMOS
Slots PCI Express 1X


REV: 1.0
PCB MADE IN CHINA
F_AUDIO
USB_LAN
VGA LPT COMA
R60
R60
R60
SPDIF_O
SYS_FAN
SATAII_PCI EXPRESS
CLR_CMOS
GIGABYTE
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775


Chipset NorthBridge
GIGABYTE
REV: 1.0
PCB MADE IN CHINA
USB_LAN
VGA LPT COMA
R60
R60
SPDIF_O
SATAII PCI EXPRESS
CLR_CMOS
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775


GIGABYTE
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775
IDE
PWR_LED
SATAII_PCI EXPRESS


Chipset SouthBridge
GIGABYTE
GIGABYTE
GA-945GCM-S2C
FSB1066
DDRII667
LGA775
IDE
PWR_LED

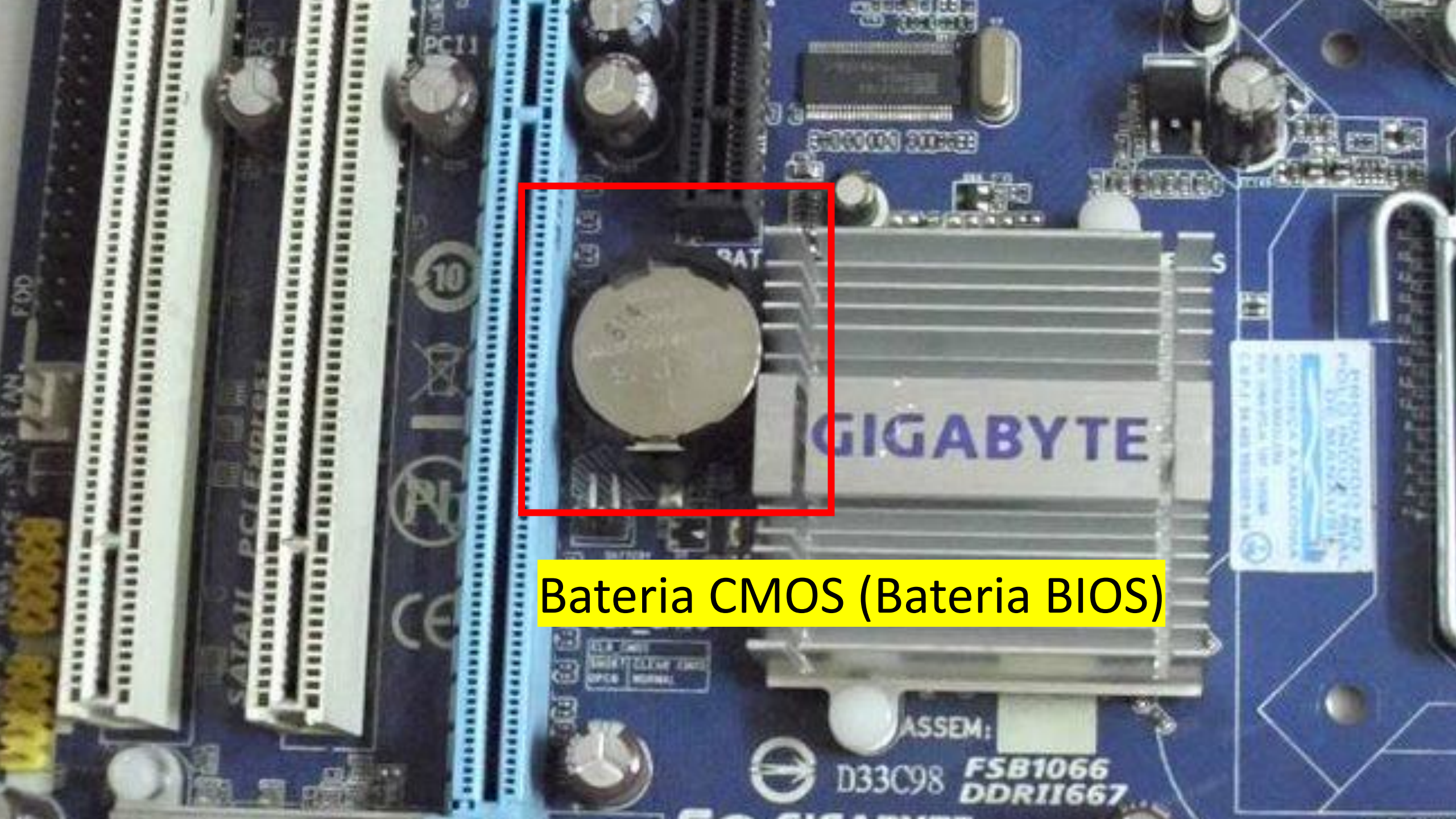

GIGABYTE
GA-945GCM-S2C
LGA775
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
IDE
PWR_LED
SATAII
PCI EXPRESS


Slots para os  pentes de memória RAM


T35
TESTE-OK
USB_LAN
VGA LPT COMA
R60
R60
PCI1
BAT
GIGABYTE
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775


Socket para o processador
USB_LAN
VGA LPT COMA
R60
R60
CLR_CMOS
ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775

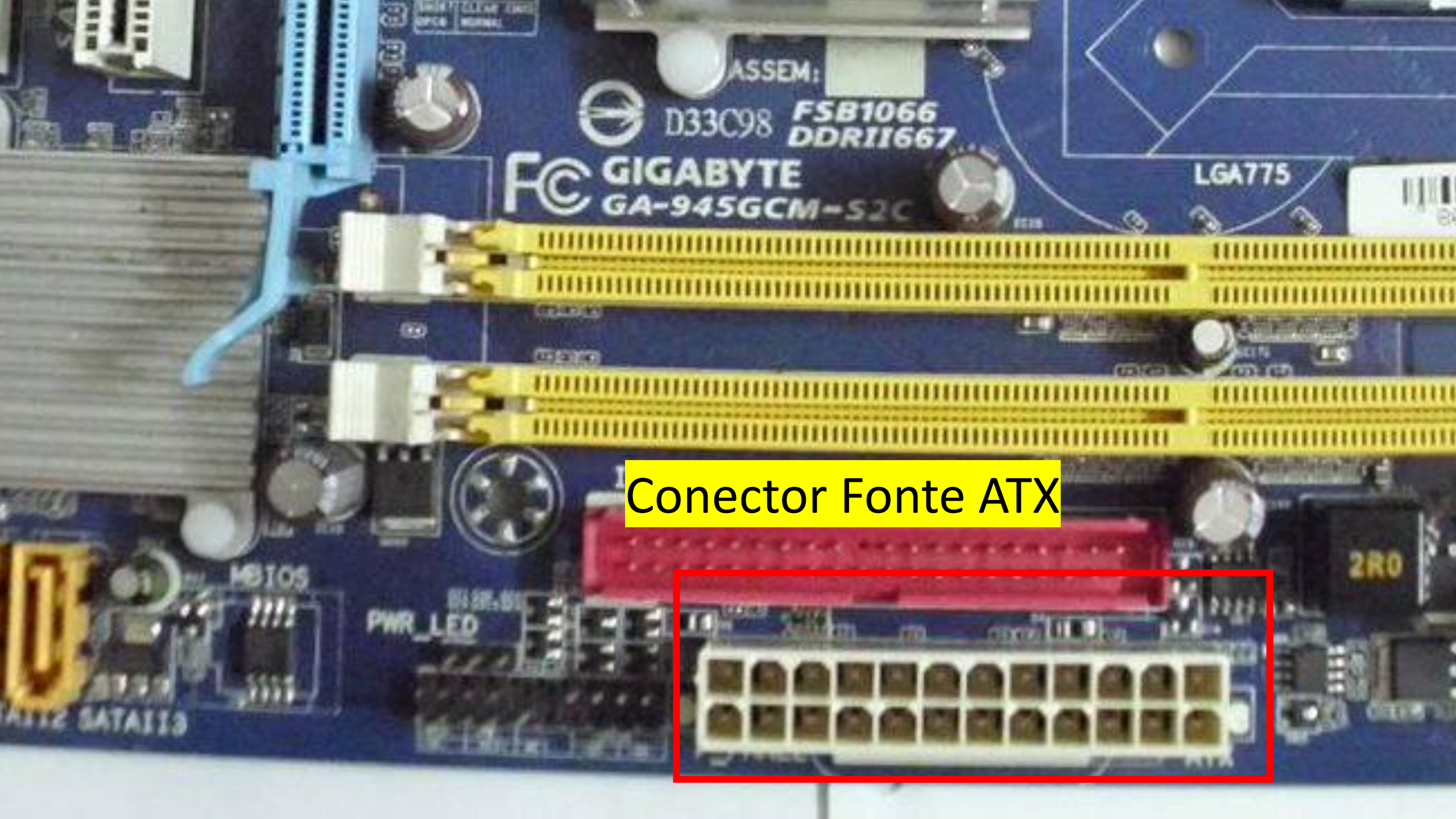

BAT
CLR_CMOS
GIGABYTE
ASSEM:
D33C98
FSB1066
DDRII667


BAT
GIGABYTE
Bateria CMOS (Bateria BIOS)
ASSEM:
D33C98
FSB1066
DDRII667

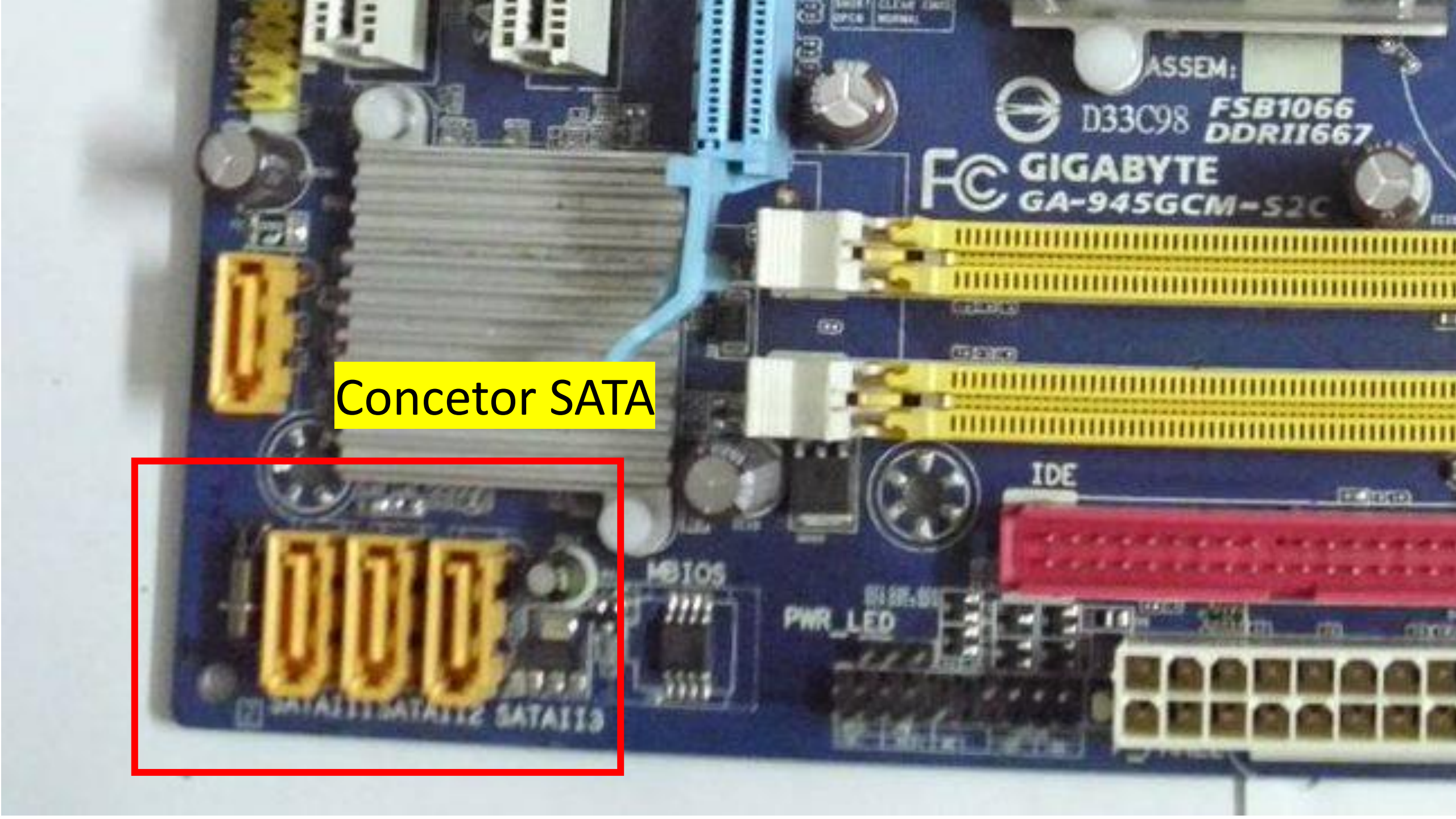

T35
TESTE OK
USB_LAN
PCI1
BAT
GIGABYTE

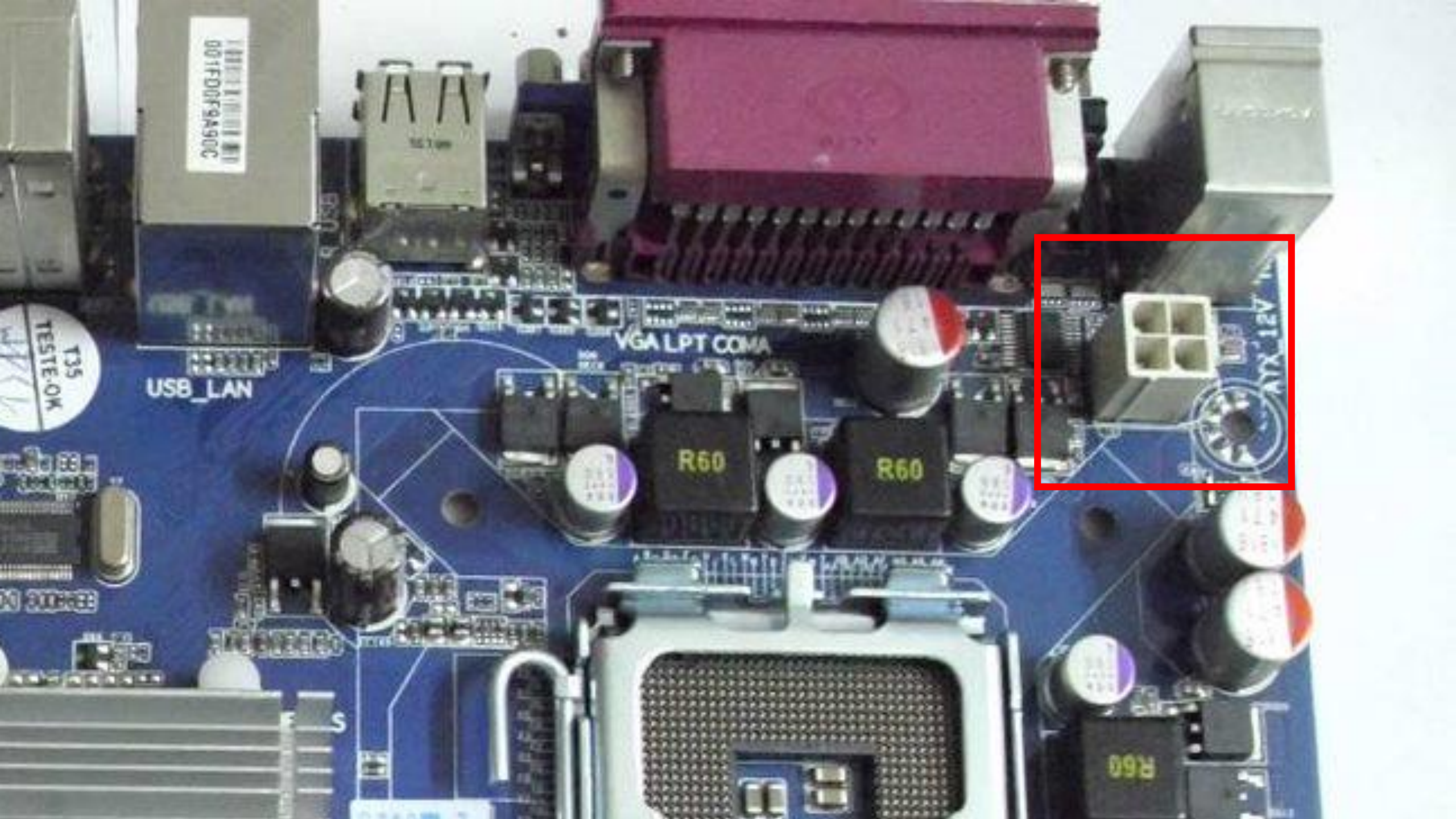

Gerador de CLOCK
GIGABYTE
USB_LAN
T35
TESTE OK
SPDIF_O
PCI1
PCI2
BAT

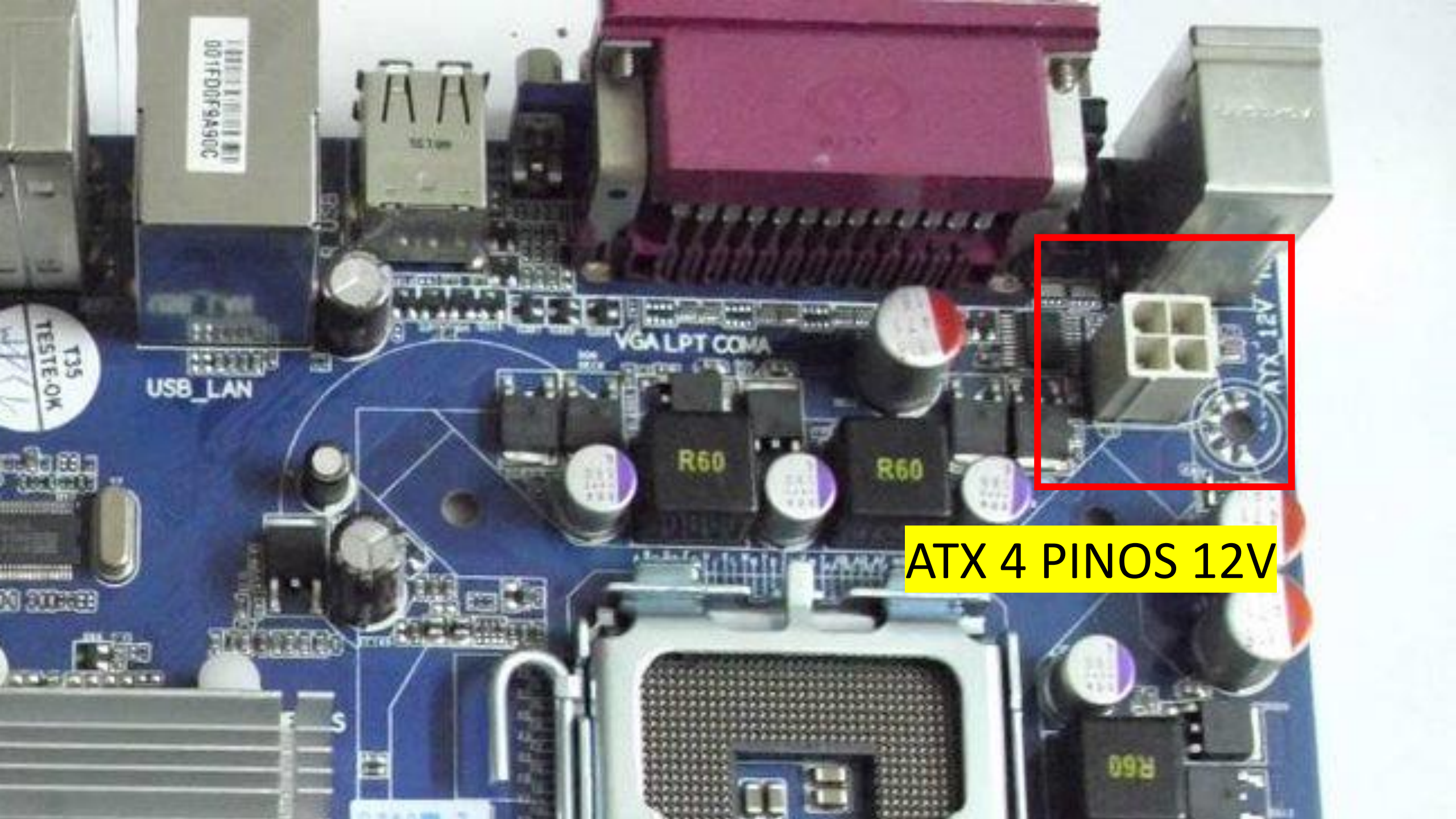

ASSEM:
D33C98
FSB1066
DDRII667
GIGABYTE
GA-945GCM-S2C
LGA775
IDE
PWR_LED
2R0


Conector Fonte ATX
GIGABYTE
GA-945GCM-S2C
FSB1066
DDRII667
LGA775
PWR_LED


GIGABYTE
GA-945GCM-S2C
FSB1066
DDRII667
D33C98
ASSEM:
IDE
PWR_LED
MBIOS


Concetor SATA
GIGABYTE
GA-945GCM-S2C
FSB1066
DDRII667
D33C98
ASSEM:
IDE
PWR_LED
SATAII3

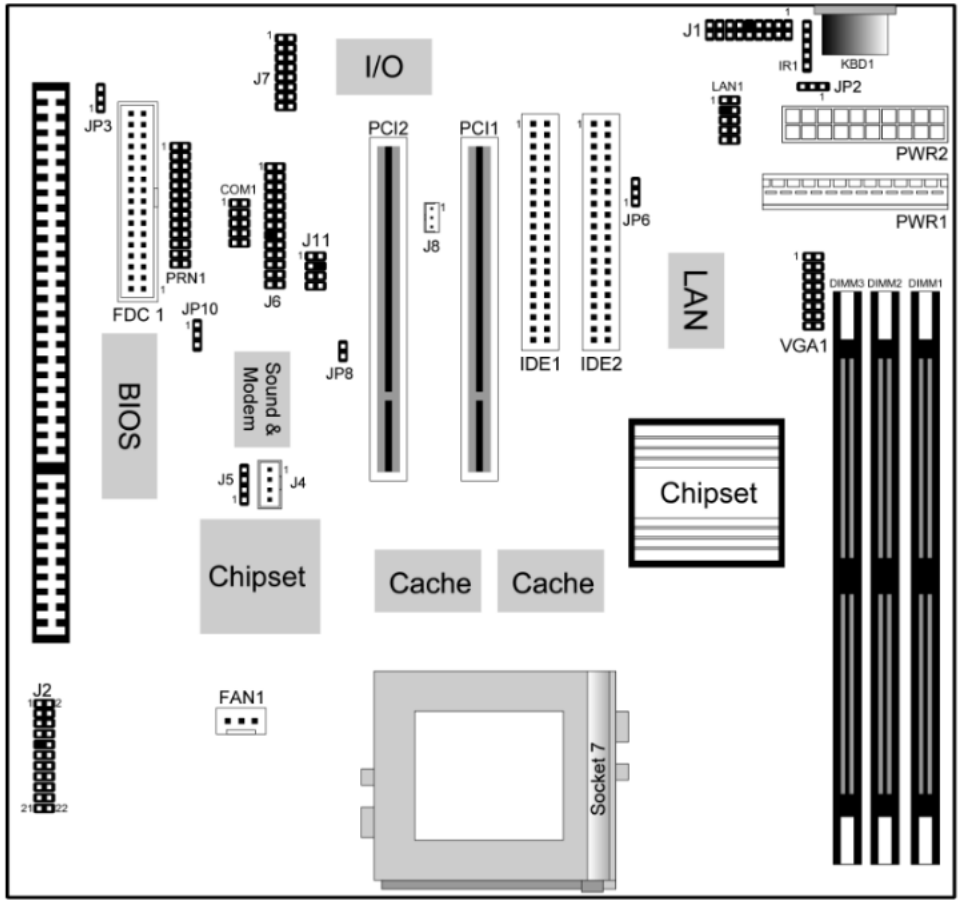

USB_LAN
VGA LPT COMA
R60
R60
T35
TESTE-OK
ATX 12V


USB_LAN
VGA LPT COMA
R60
R60
ATX 12V
ATX 4 PINOS 12V

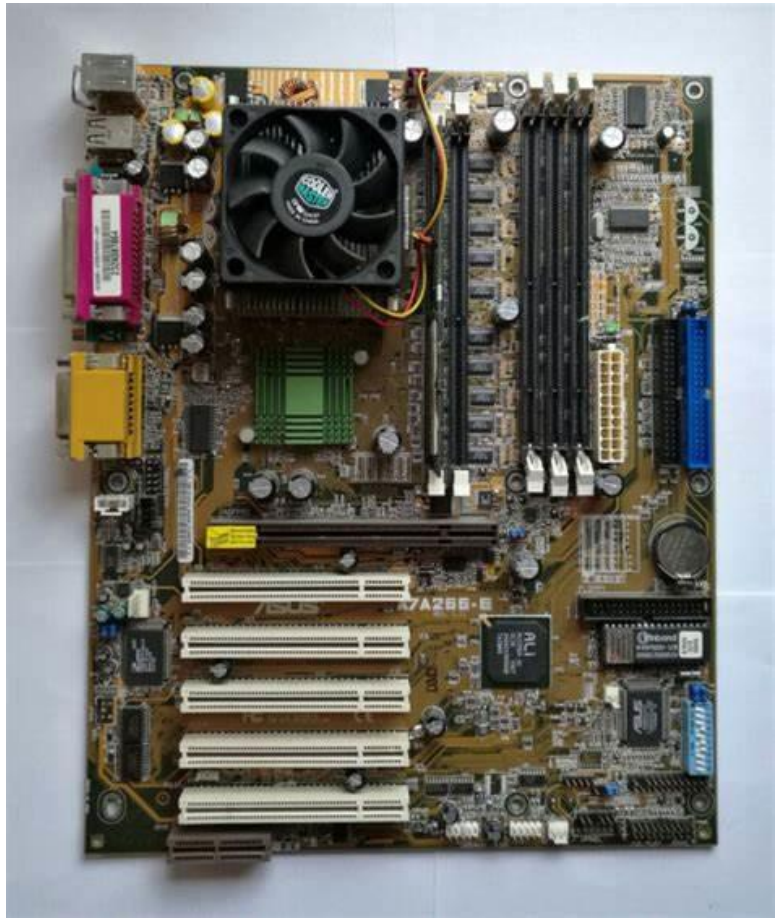
# Como saber tudo isso?

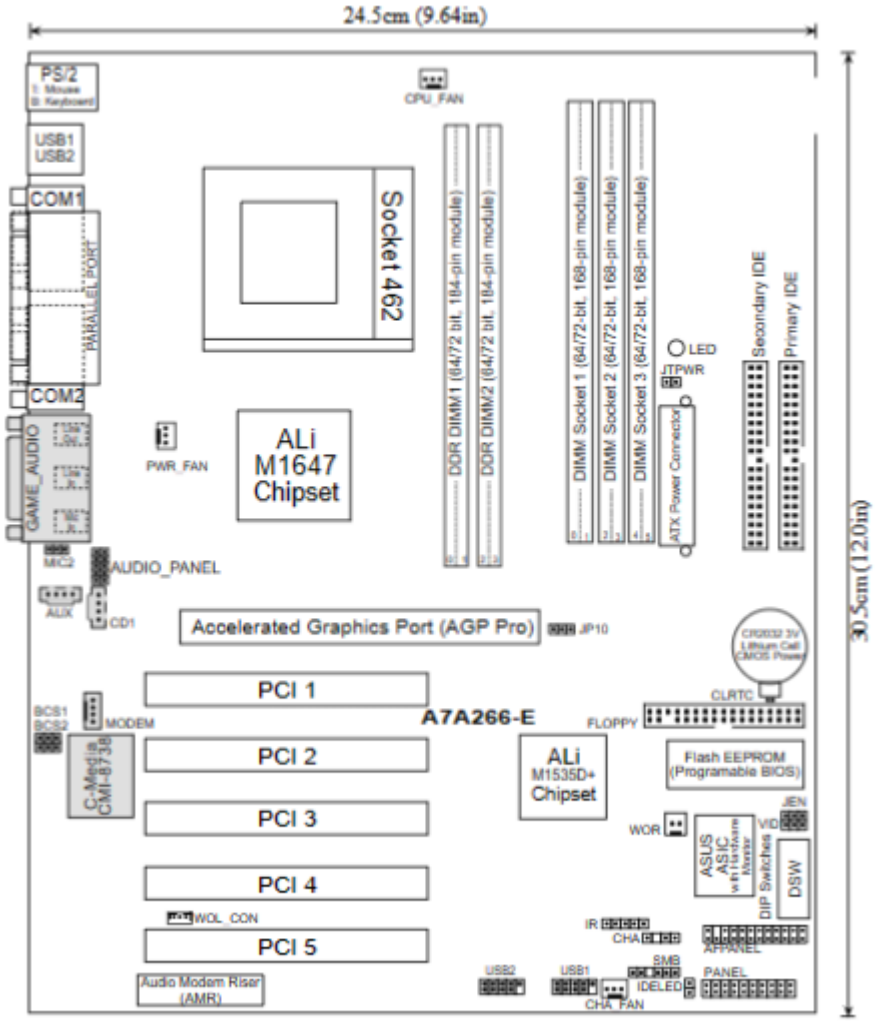
Consultando o Manual da Placa –Mãe

# Diagrama da Placa M598LMR

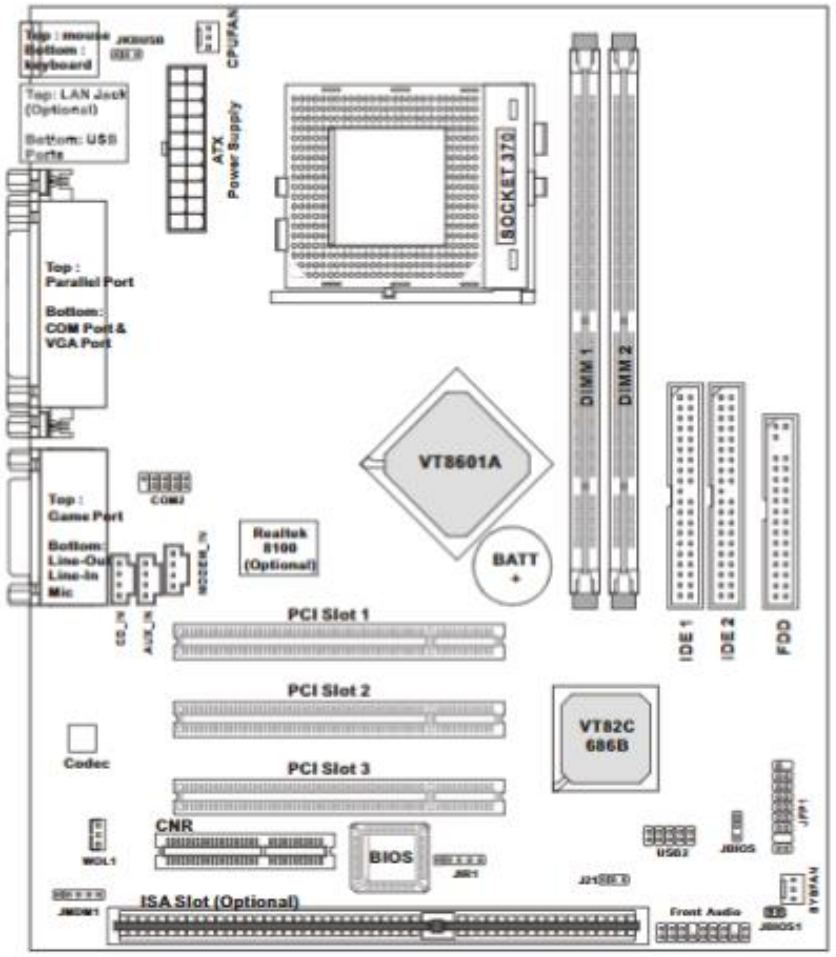



# A7A266-E




24.5cm (9.64in)
30.5cm (12.0in)
PS/2
CPU_FAN
USB1
USB2
COM1
COM2
PARALLEL PORT
Socket 462
DDR DIMM1 (64/72 bit, 184-pin module)
DDR DIMM2 (64/72 bit, 184-pin module)
DIMM Socket 1 (64/72-bit, 168-pin module)
DIMM Socket 2 (64/72-bit, 168-pin module)
DIMM Socket 3 (64/72-bit, 168-pin module)
LED
JTPWR
ATX Power Connector
Secondary IDE
Primary IDE
GAME_AUDIO
PWR_FAN
ALi
M1647
Chipset
MIC2
AUDIO_PANEL
AUX
CD1
Accelerated Graphics Port (AGP Pro)
JP10
PCI 1
PCI 2
PCI 3
PCI 4
PCI 5
A7A266-E
BCS1
BCS2
MODEM
C-Media
CMI-8738
FLOPPY
CLRTC
ALi
M1535D+
Chipset
Flash EEPROM
(Programable BIOS)
WOR
JEN
VID
ASUS
ASIC
DIP Switches
DSW
WOL_CON
IR
CHA
SMB
IDELED
PANEL
Audio Modem Riser
(AMR)
USB2
USB1
CHA_FAN

# G52-MA00353


Top : mouse
Bottom : keyboard
Top: LAN Jack (Optional)
Bottom: USB Ports
CPUFAN
ATX Power Supply
SOCKET 370
DIMM 1
DIMM 2
Top : Parallel Port
Bottom: COM Port & VGA Port
VT8601A
COM2
Top : Game Port
Bottom: Line-Out Line-In Mic
Realtek 8100 (Optional)
BATT
MODEM_IN
CD_IN
AUX_IN
PCI Slot 1
PCI Slot 2
PCI Slot 3
IDE 1
IDE 2
FDD
VT82C 686B
Codec
CNR
WOL1
BIOS
JBR1
USB2
JBIOS
J21
Front Audio
JBIOS1
JWDM1
SYSFAN1
ISA Slot (Optional)

# Vamos analisar os manuais?

- Disponíveis no Teams