

А теперь про железо



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Внимание

Материалы данной презентации
носят ознакомительный характер
и представлены исключительно в
целях обучения

Что по плану?

- Компьютер или ноутбук
 - процессор
 - охлаждение
 - ОЗУ
 - жесткий диск
 - видеокарта
 - материнская плата
 - блок питания
 - монитор
 - корпус
- Графическое оборудование
 - компьютерная мышь
 - графический планшет
 - графический монитор
- Аудио оборудование
 - аудиоинтерфейс
 - устройства ввода
 - мониторы, наушники
- ИБП (источник бесперебойного питания)

Зачем?

У художника кисточки,
а у нас железки

Компьютер и
сопутствующие приборы
- это инструмент.

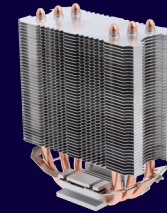
Что бы понимать на
что способен ваш
инструмент, нужно
разобраться как и что
влияет на его работу



Процессор



Материнская
плата



Охлаждение

Блок
питания



Оперативная
память



Компьютер



Корпус

Монитор



Видеокарта



Жесткий
диск

Процессор

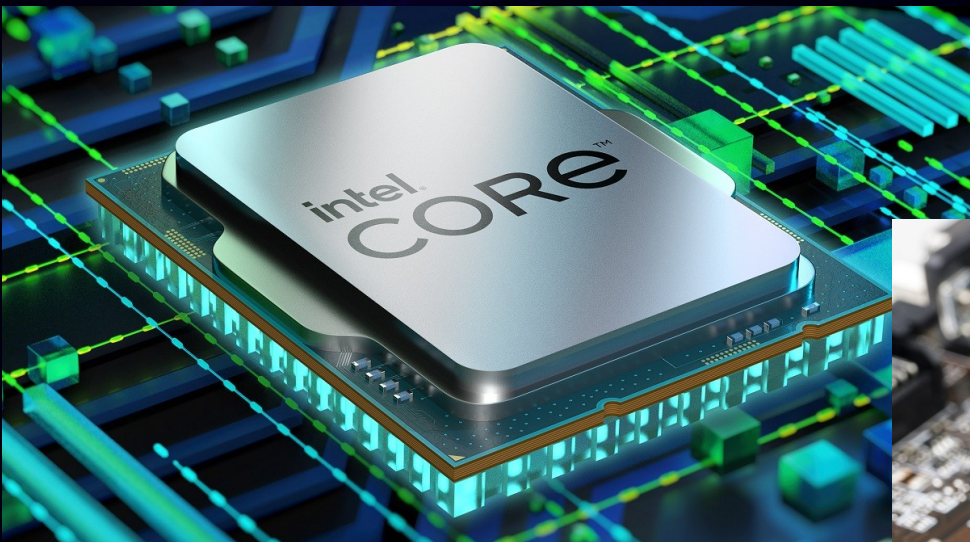
Производительность
в одного ядра
(от 2МГц)

Больше ядер —
быстрее рендер
(от 2 ядер)

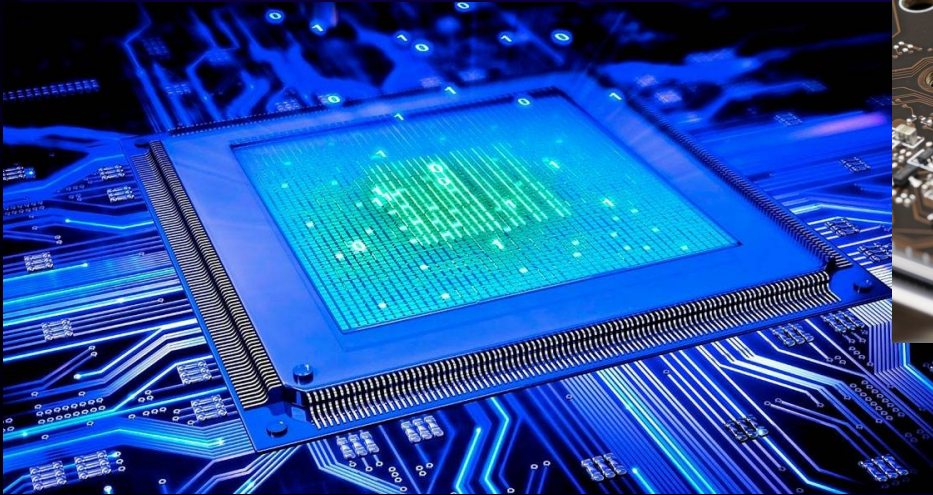
Мощность или
максимальный TDP



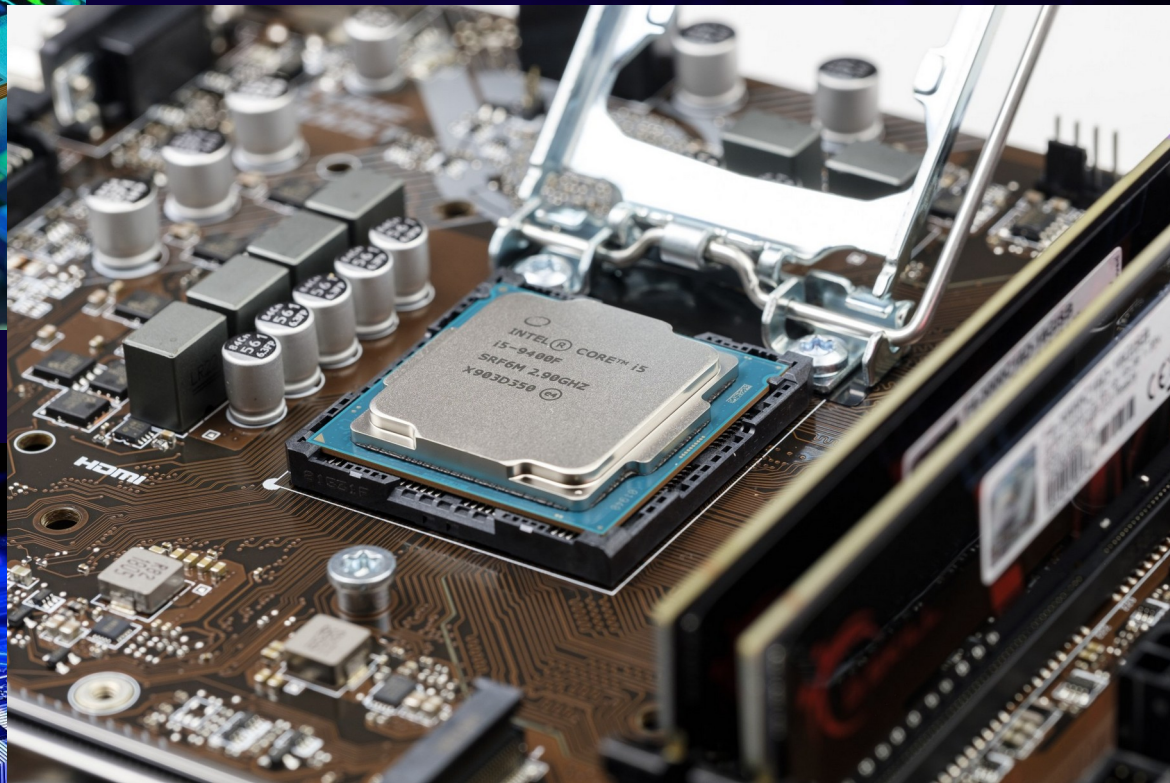
Сокет



Реклама



Реальность





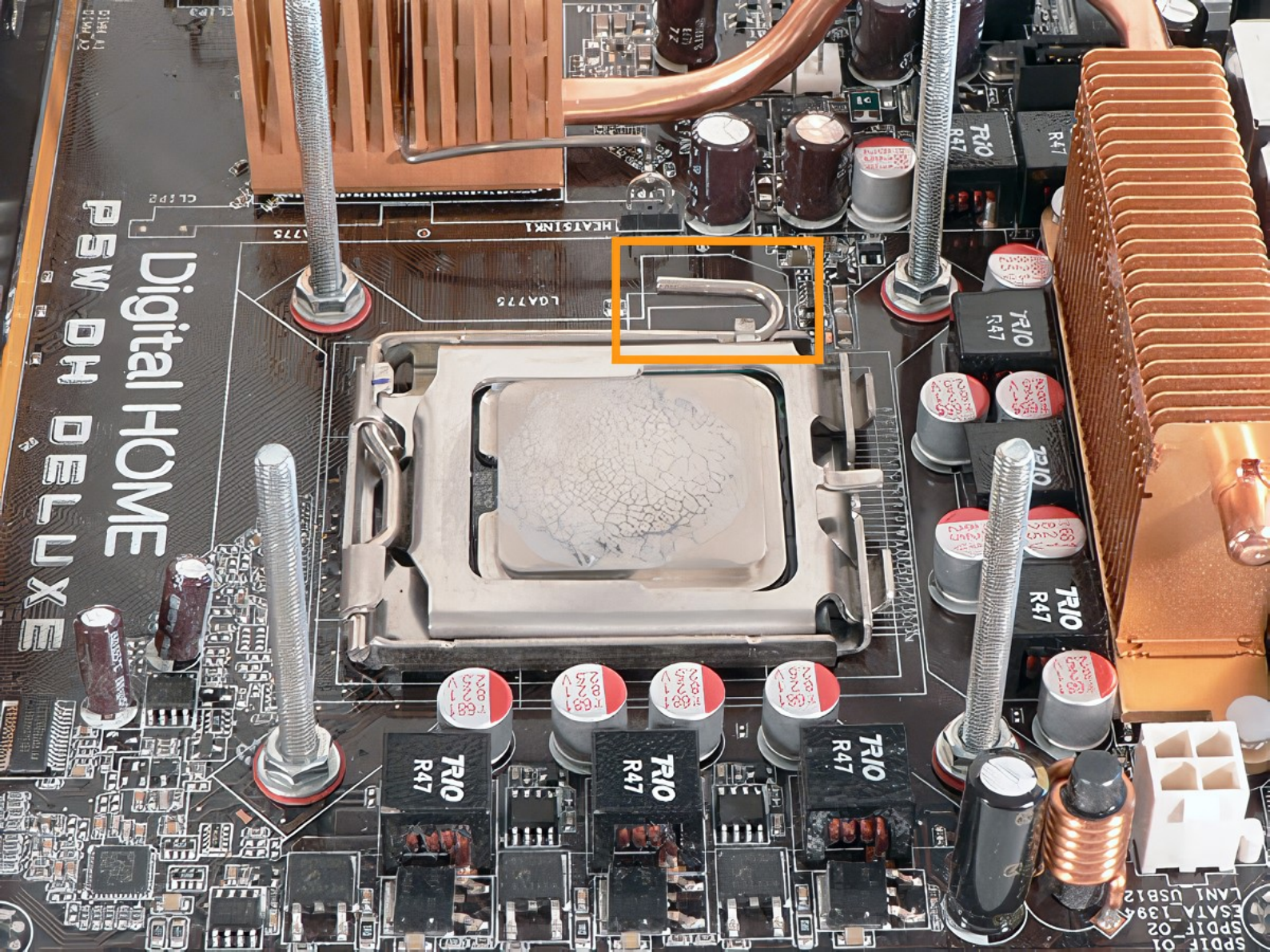
INTEL CONFIDENTIAL
NA
QNMN 2.80GHZ
L719C148 (e4)

1007R3 R15 25PH17L
1007R3 R15 25PH17L
1007R3 R15 25PH17L
1007R3 R15 25PH17L
1007R3 R15 25PH17L

FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63
FP 72CG 501 63

FP 72CG 501 63
FP 72CG 501 63

Intel Core i7-11570U



Digital HOME
PSW OH DELUXE



T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

T10
R47

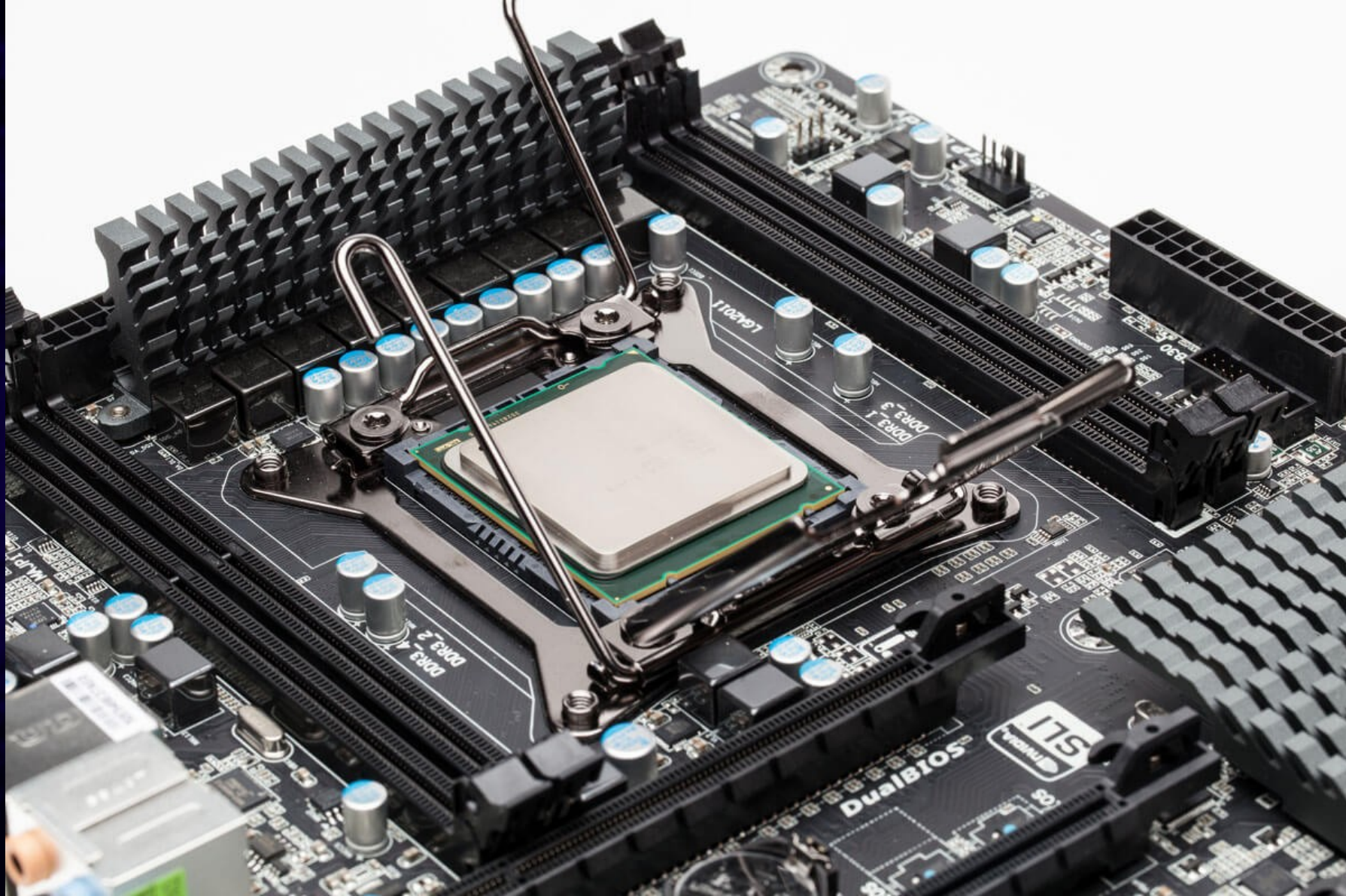
LOA775

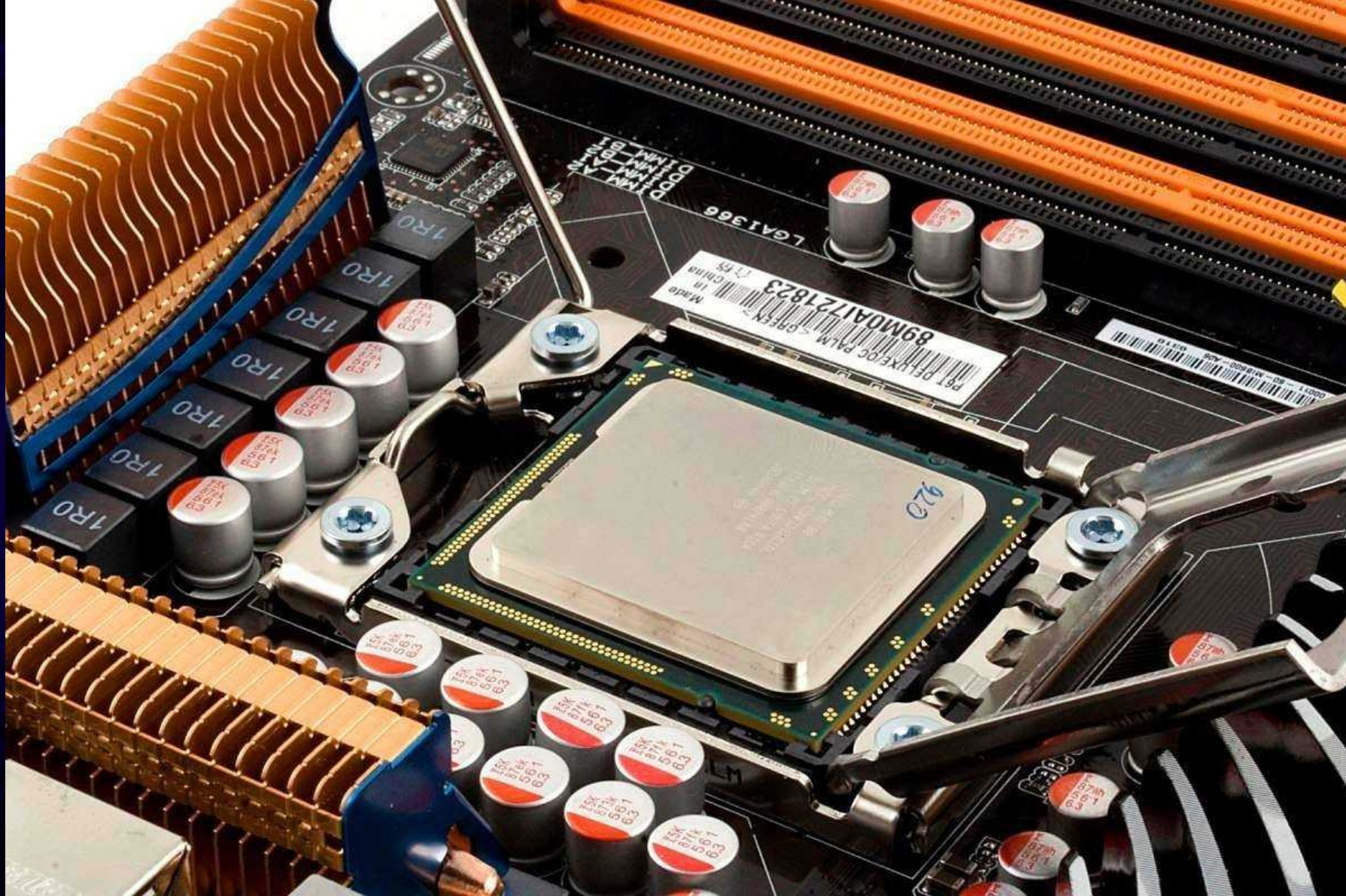
HEATSINK1

CL1P2

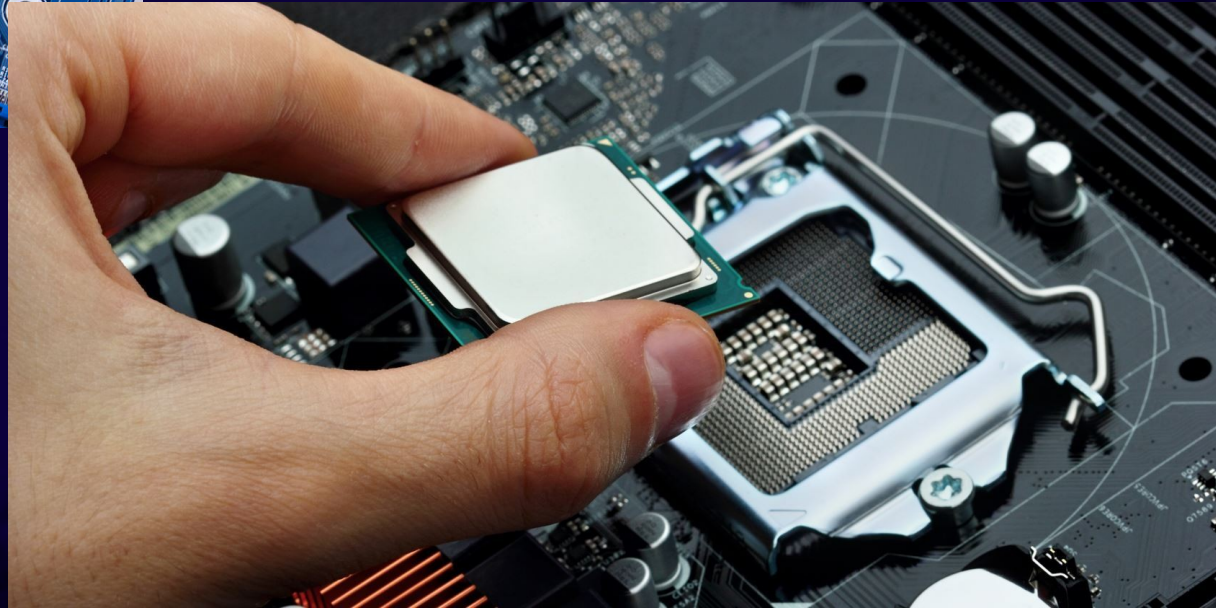
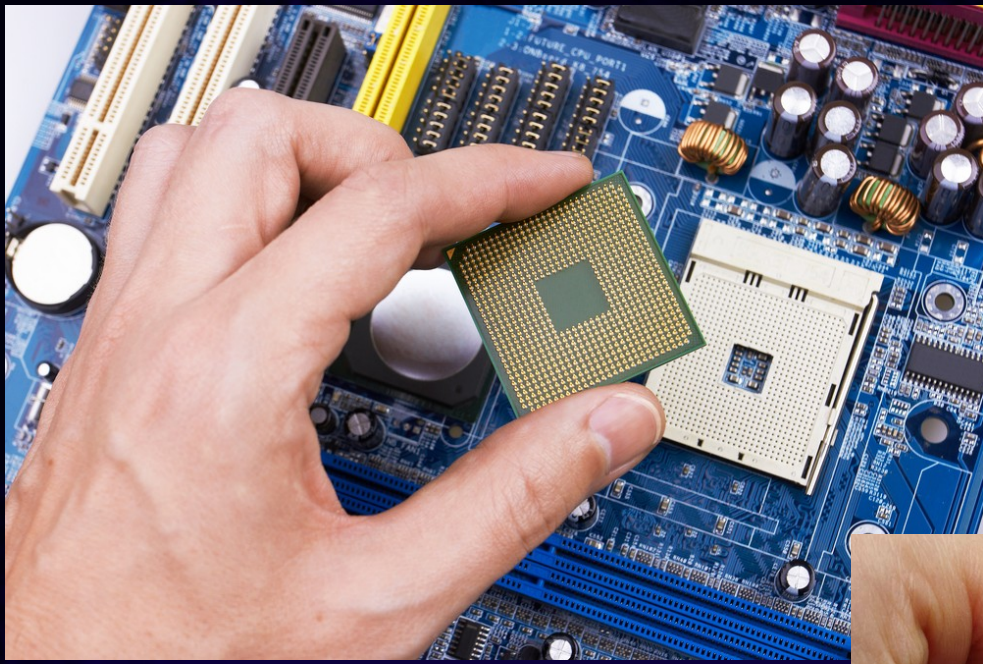
CHINA

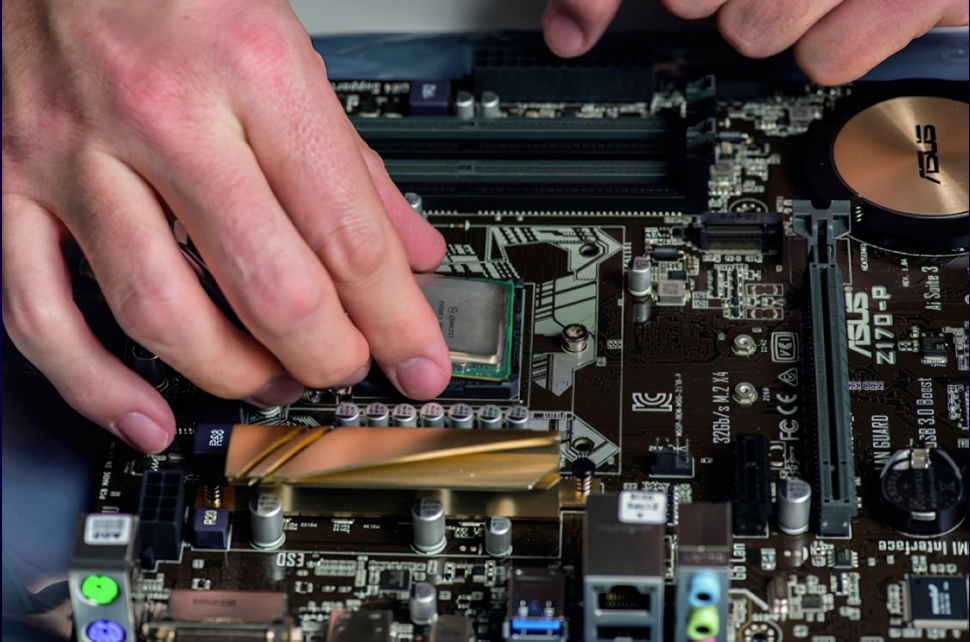
SPDIF_01
SATA_1394
LAN1_USB12



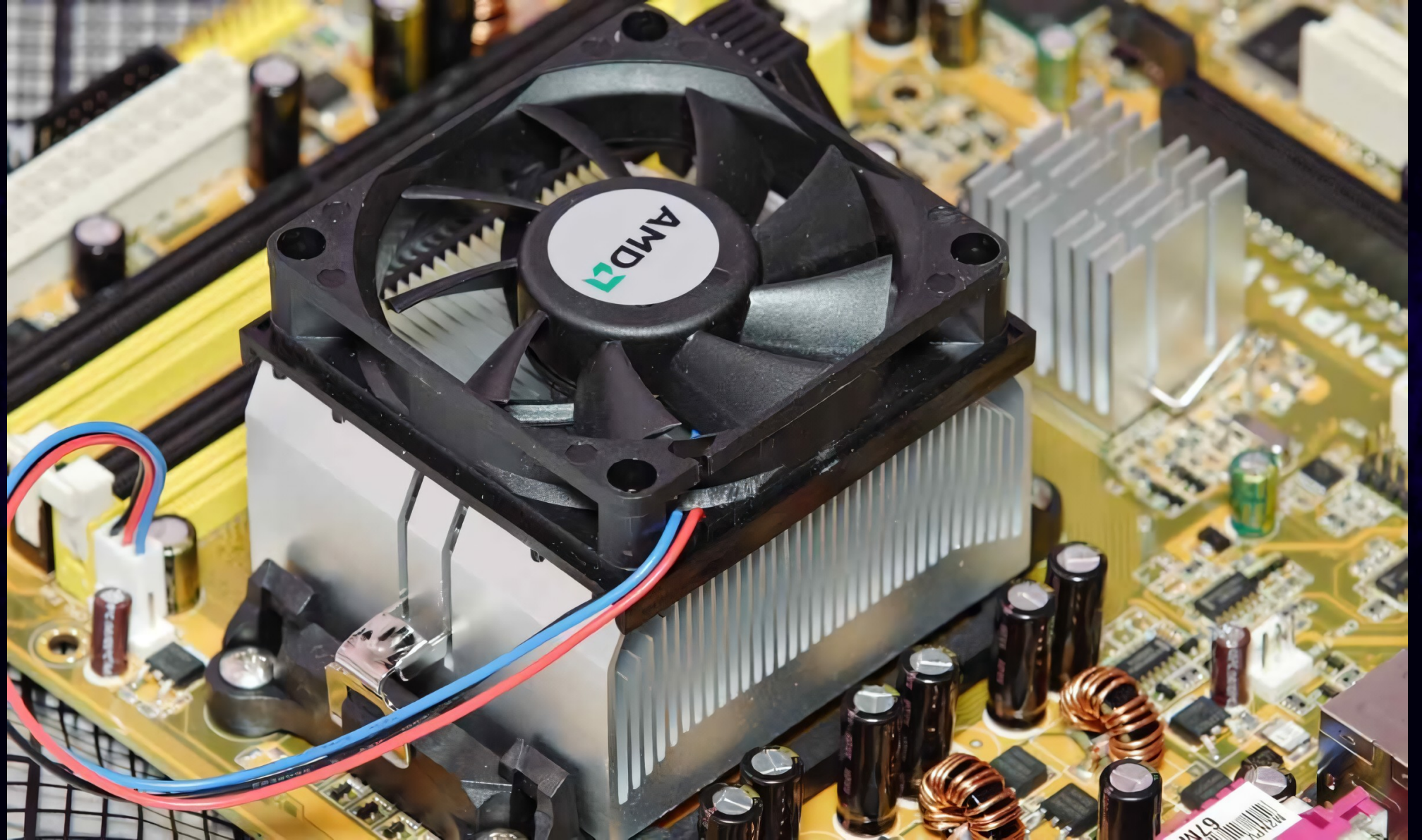








MO
YO





GIGABYTE

NZXT

CORSAIR

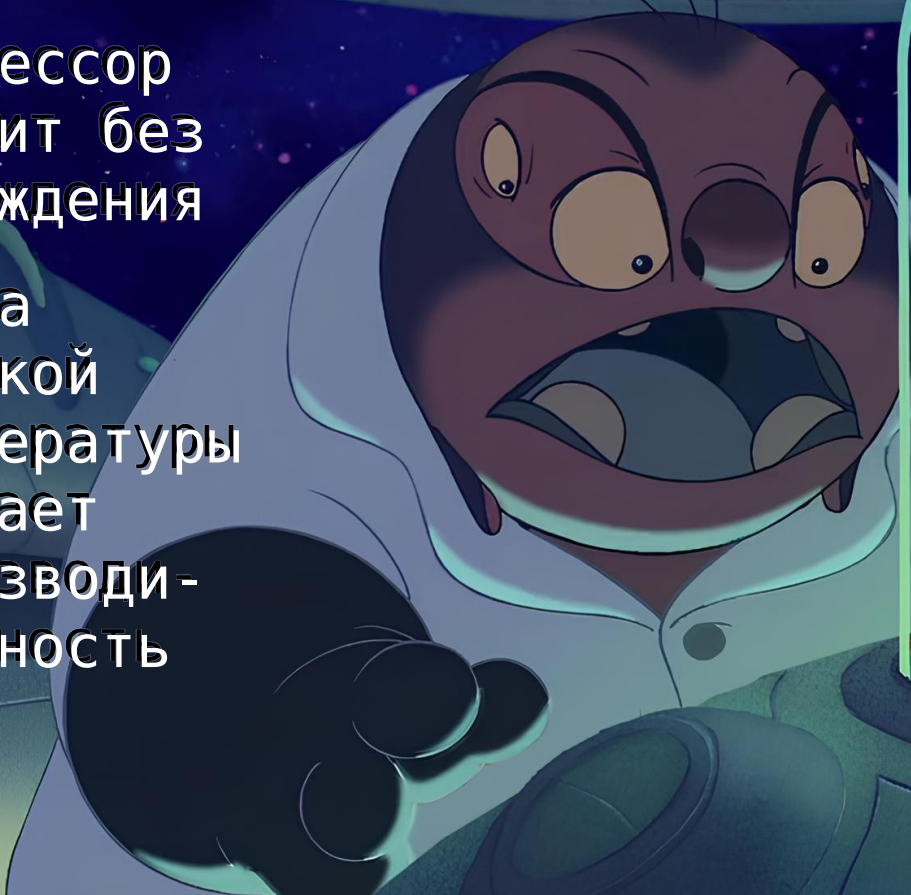
ErP Ready

GEFORCE

А зачем охлаждение?

1. Процессор
сгорит без
охлаждения

2. Из-за
высокой
температуры
падает
производи-
тельность





Охлаждение

**Мощность или
максимальный TDP**
(TDP процессора должен
быть меньше TDP
системы охлаждения)

Размер

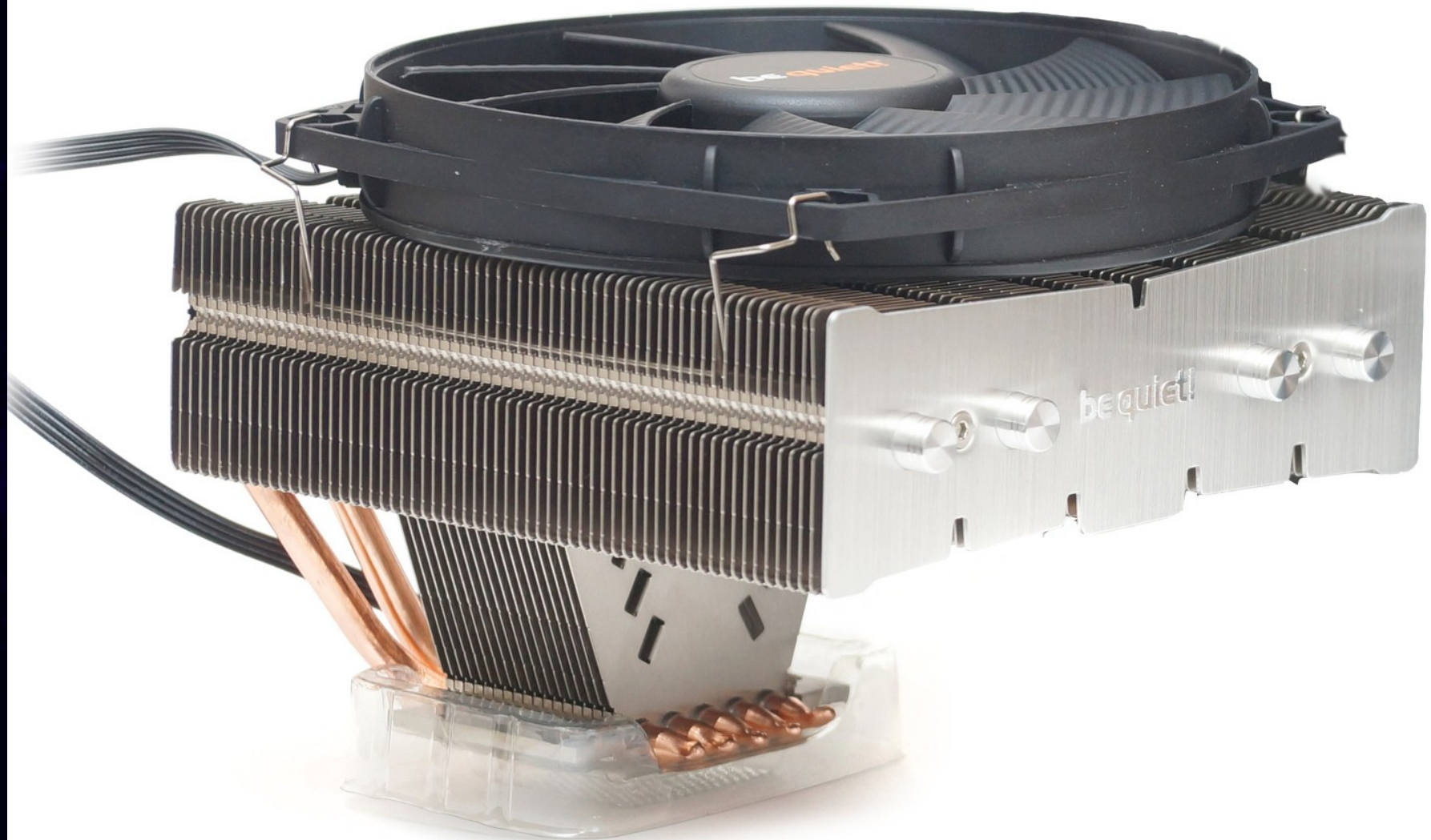








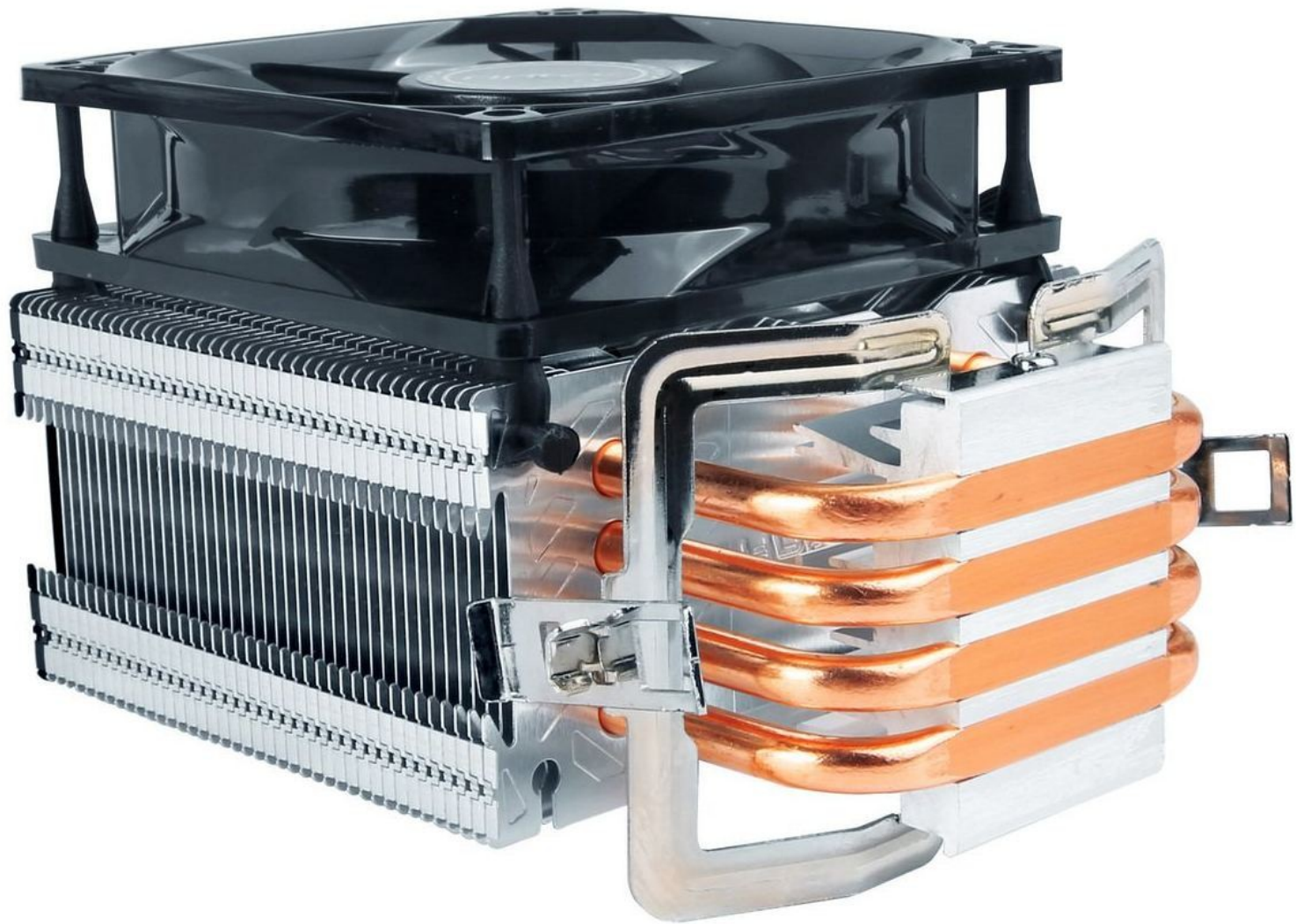


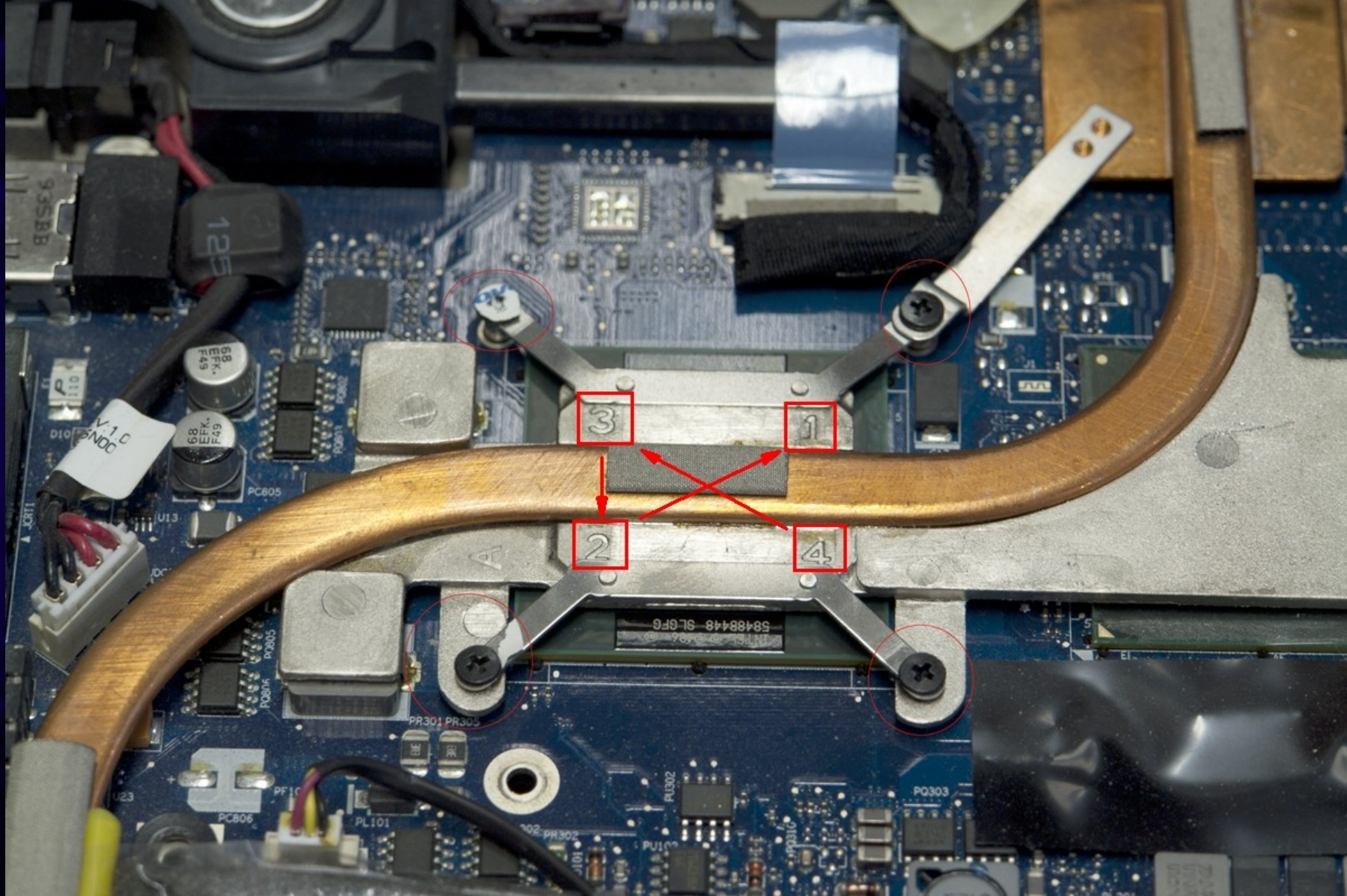












3

1

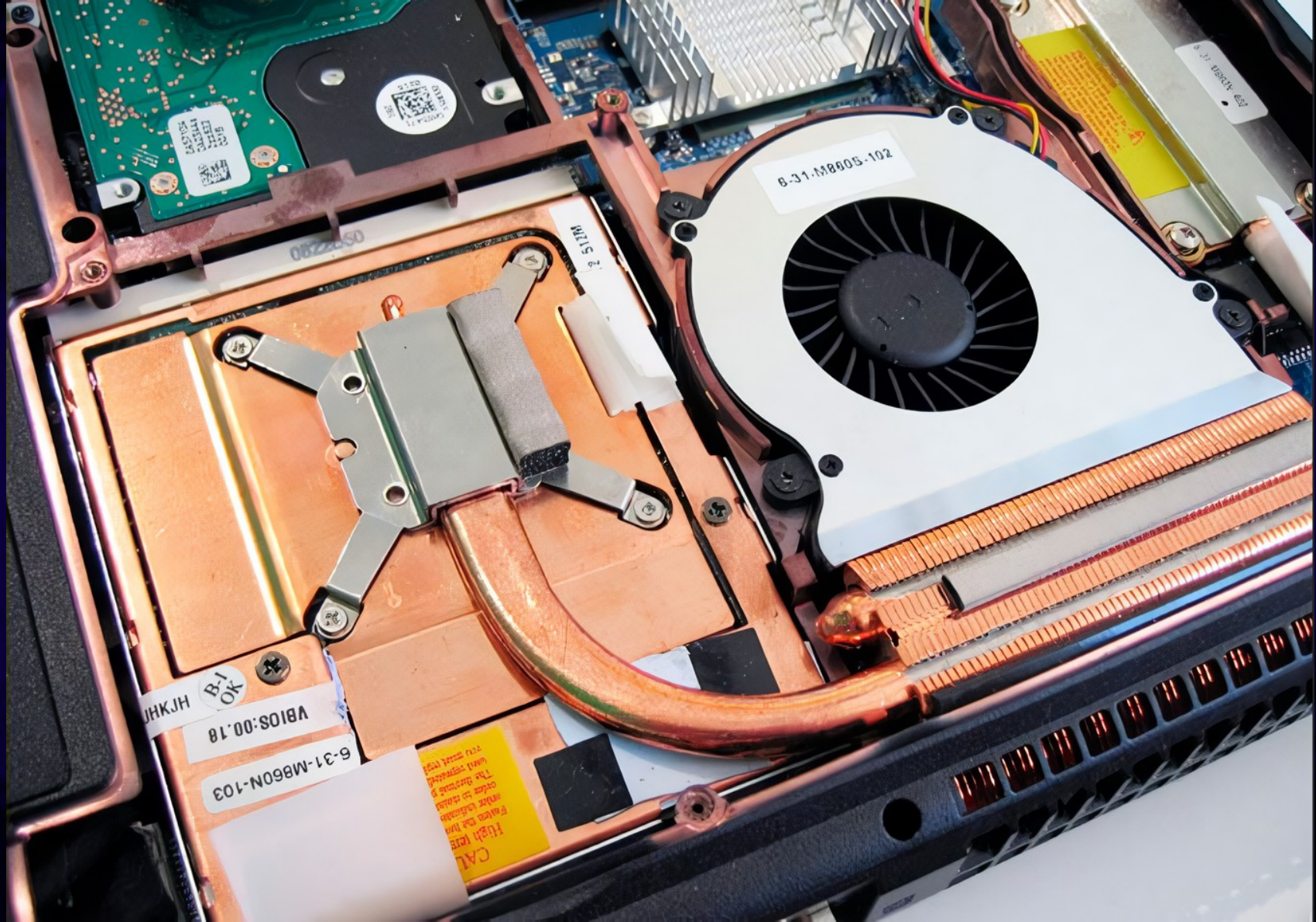
2

4

PR301 PR305

5848B448-9L6FG

PQ303





acer

FOR REPAIR USE ONLY
DO NOT REMOVE FROM BOARD
A-HUD1F
9-16

Kingston
SATA
2.5" 7MM
SATA
Model: SA400S37
Serial: 217A8000A010141701
Part: 20001130 1330 13000
Date: 09-10-2010

RAM
A-HUD1F
9-16

Model Name 型号: AP16H
on the Battery Pack (在电池包上)

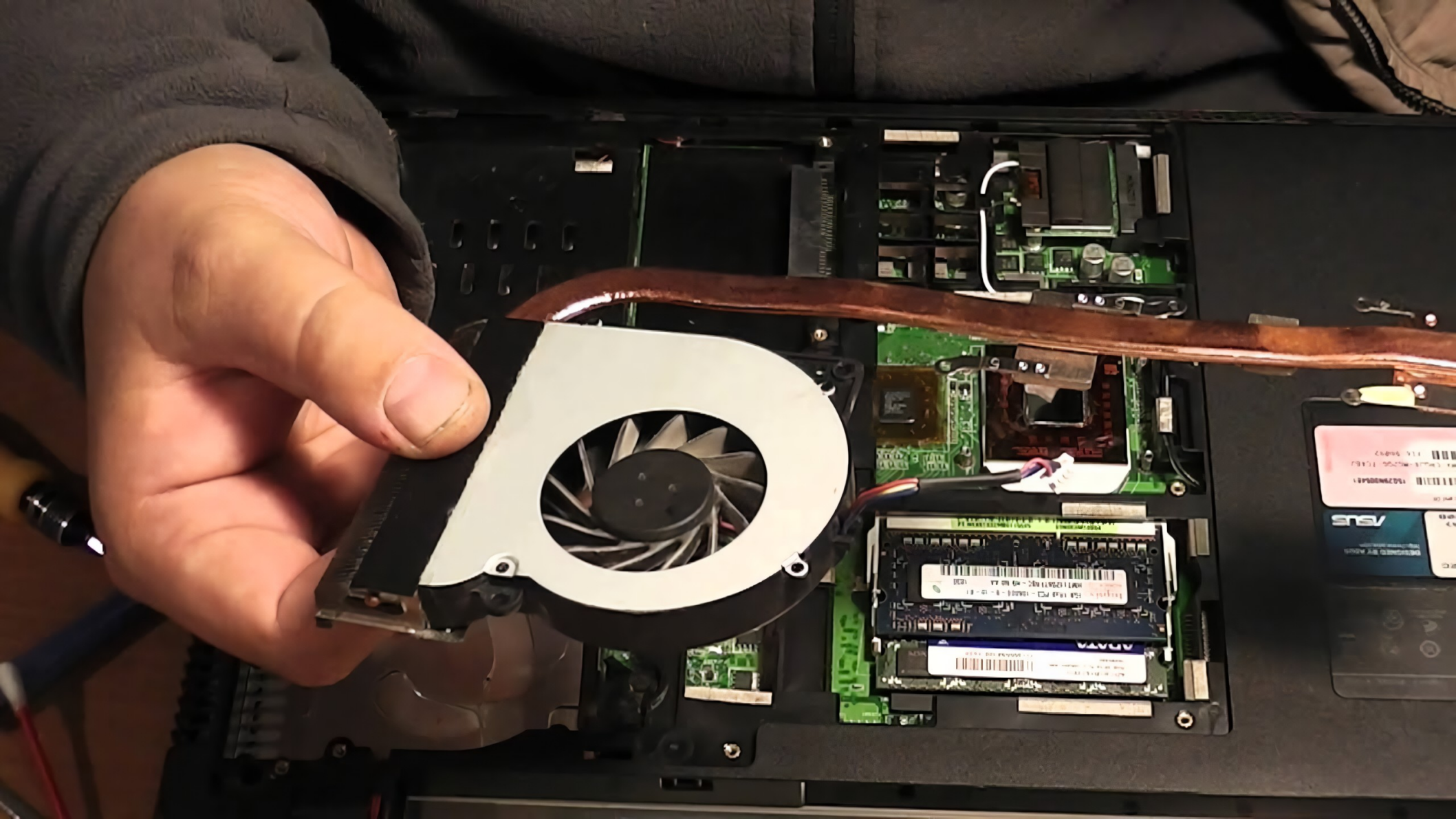
CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions. Do not burn.
警告: 电池可能爆炸, 如果更换了错误的电池类型。请按照说明处理用过的电池。请勿焚烧。

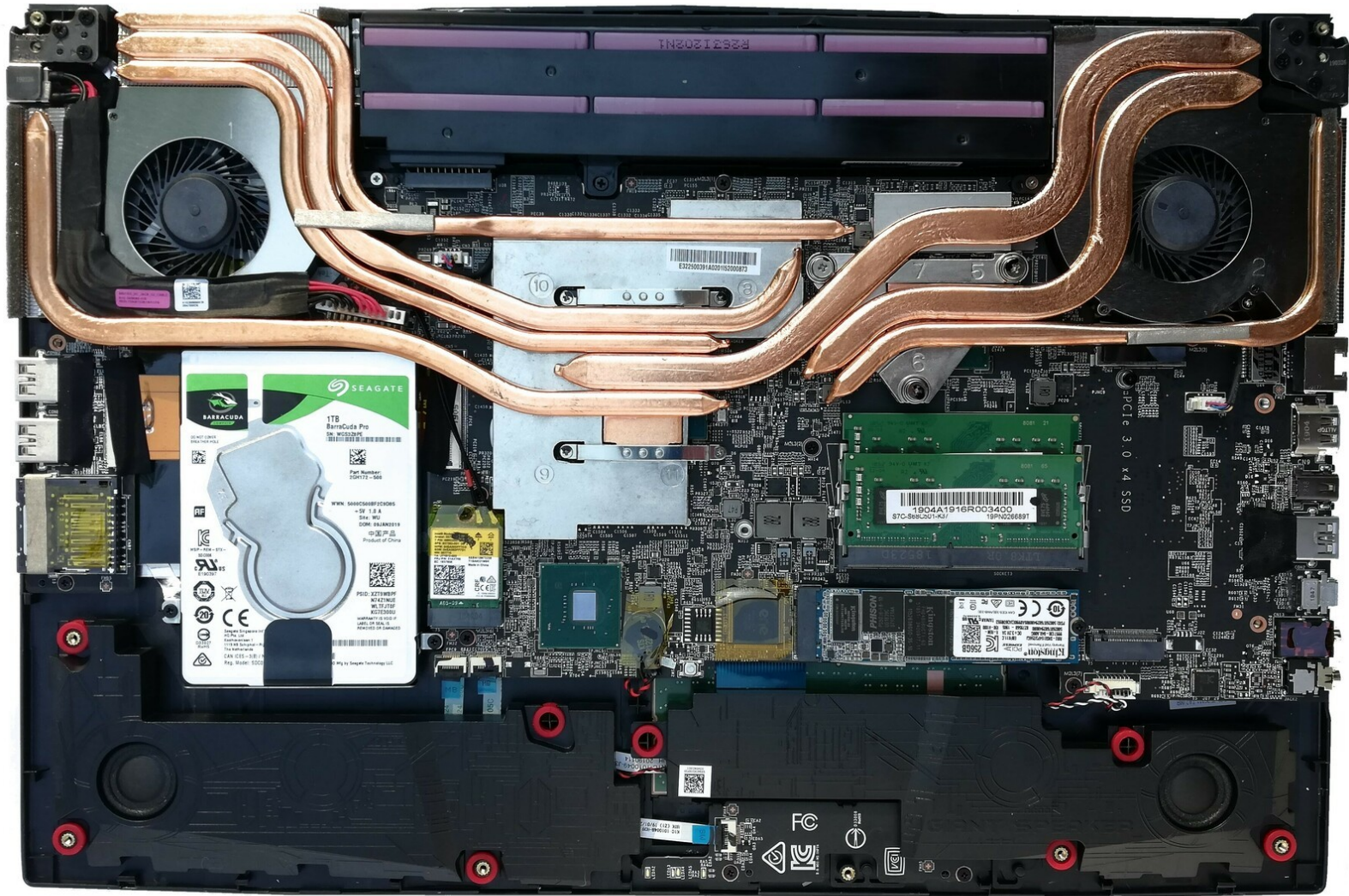
CAUTION: Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions. Do not burn.
警告: 电池可能爆炸, 如果更换了错误的电池类型。请按照说明处理用过的电池。请勿焚烧。

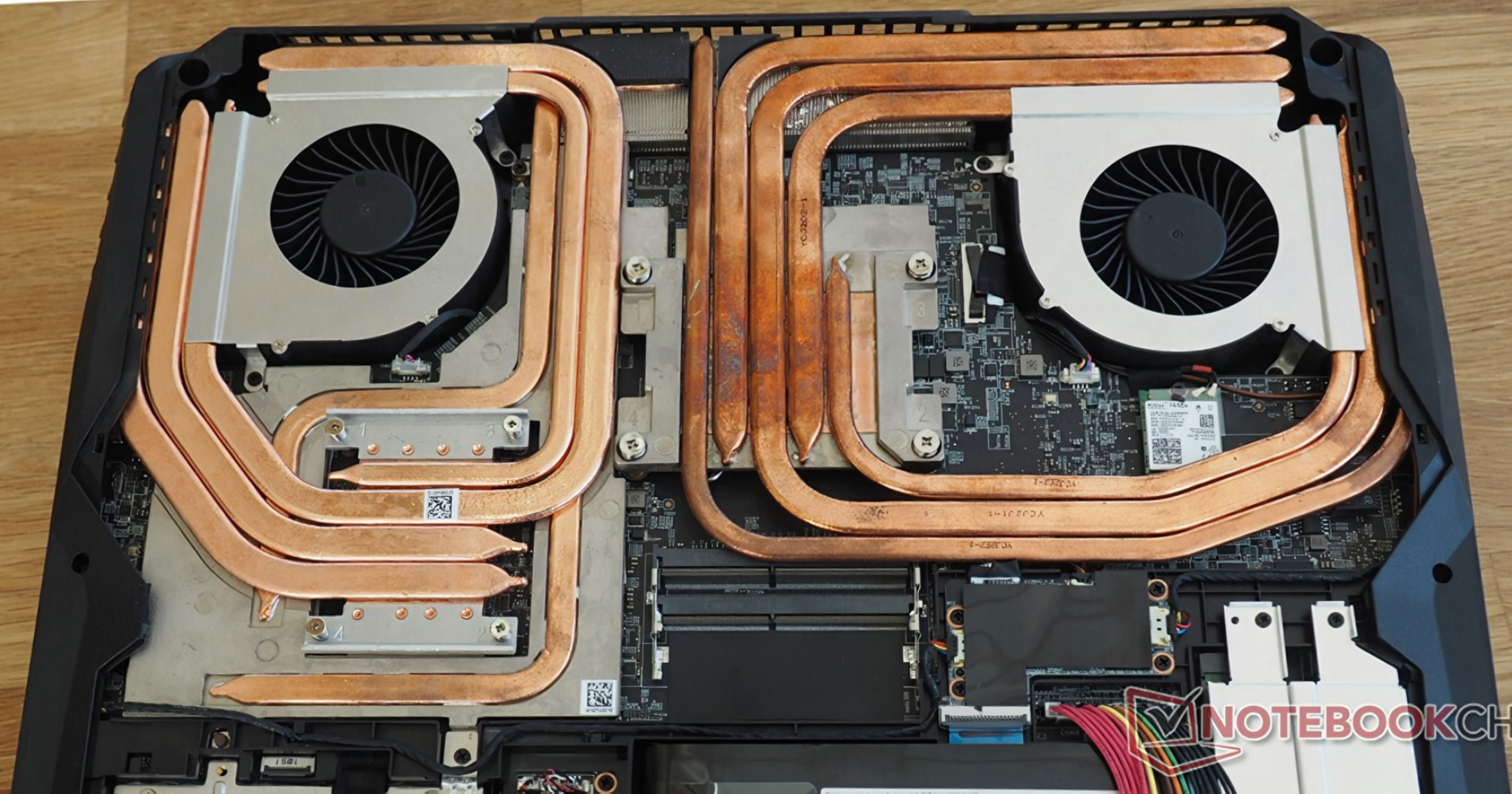


ACER
TOSHIBA
Acer Computer Co., Ltd.









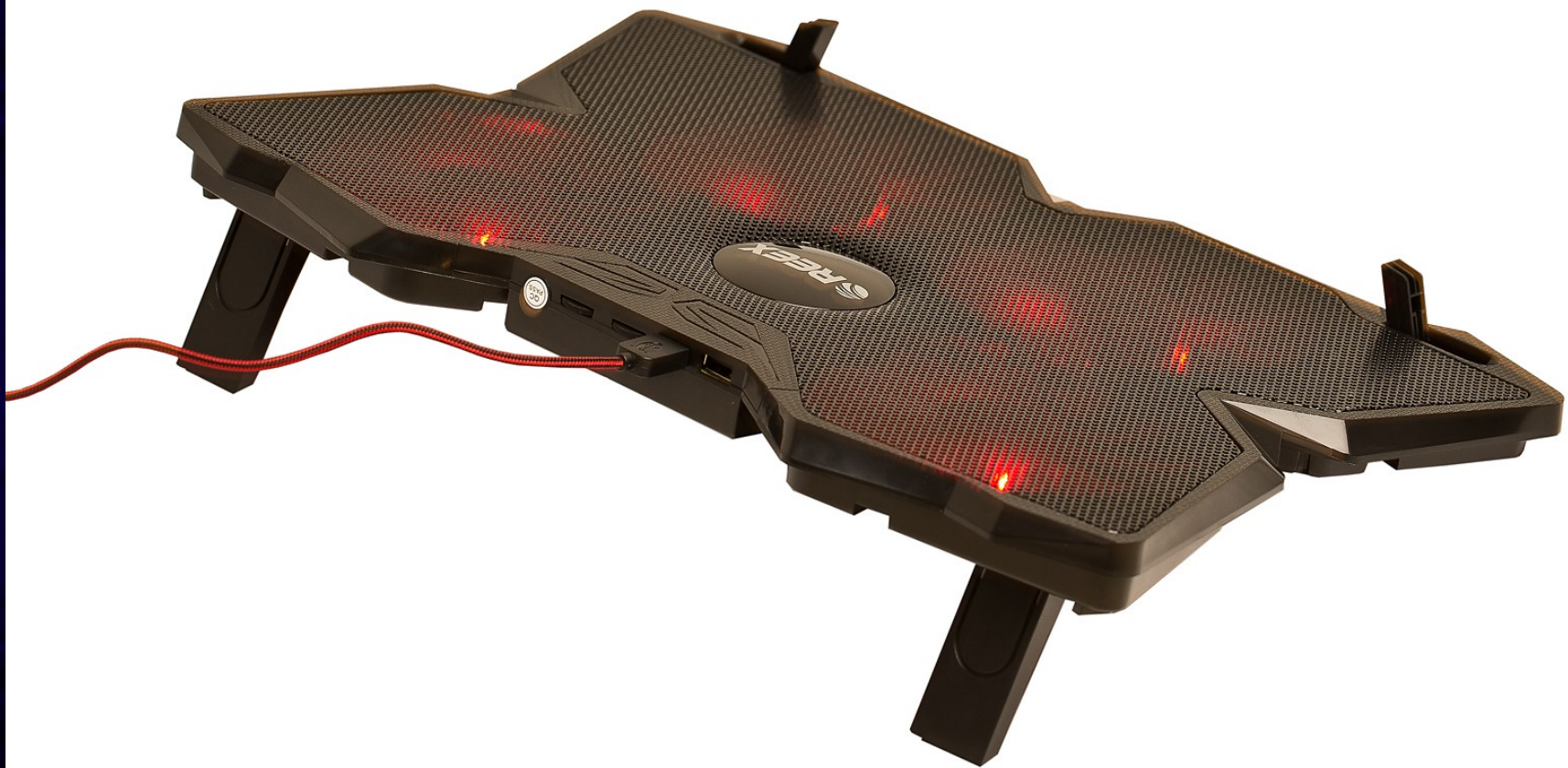






RENDERING BY SHIPRO









S24D590L

ОЗУ

(Оперативное Запоминающее Устройство)

Скорость / частота

(в соответствии с процессором)

Тип памяти

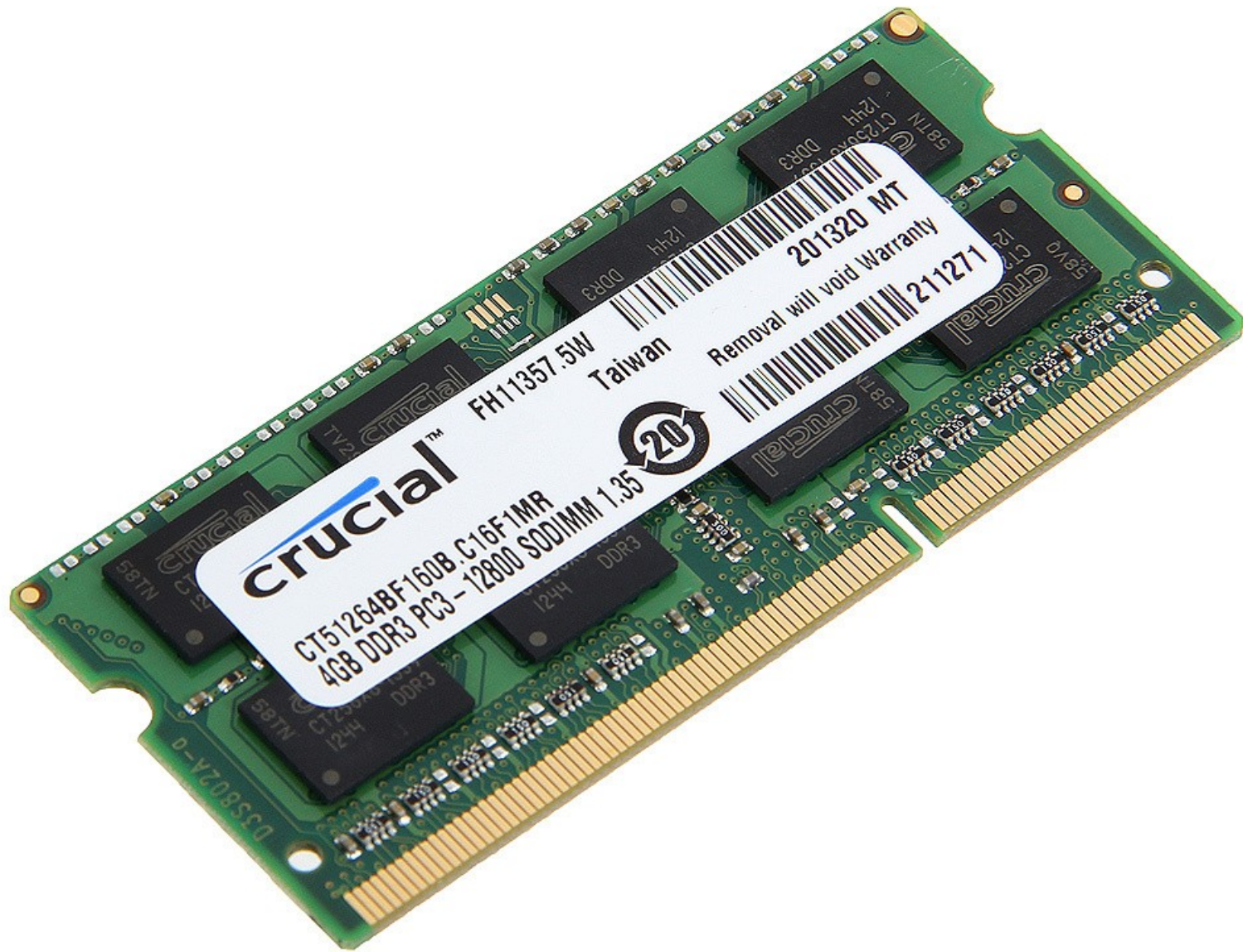
(от DDR 4)

Объём

(суммарный объём памяти от 8ГБ, лучше от 16)







crucial[™]

CT51264BF160B.C16F1MR
4GB DDR3 PC3 - 12800 SODIMM 1.35V

FH11357.5W

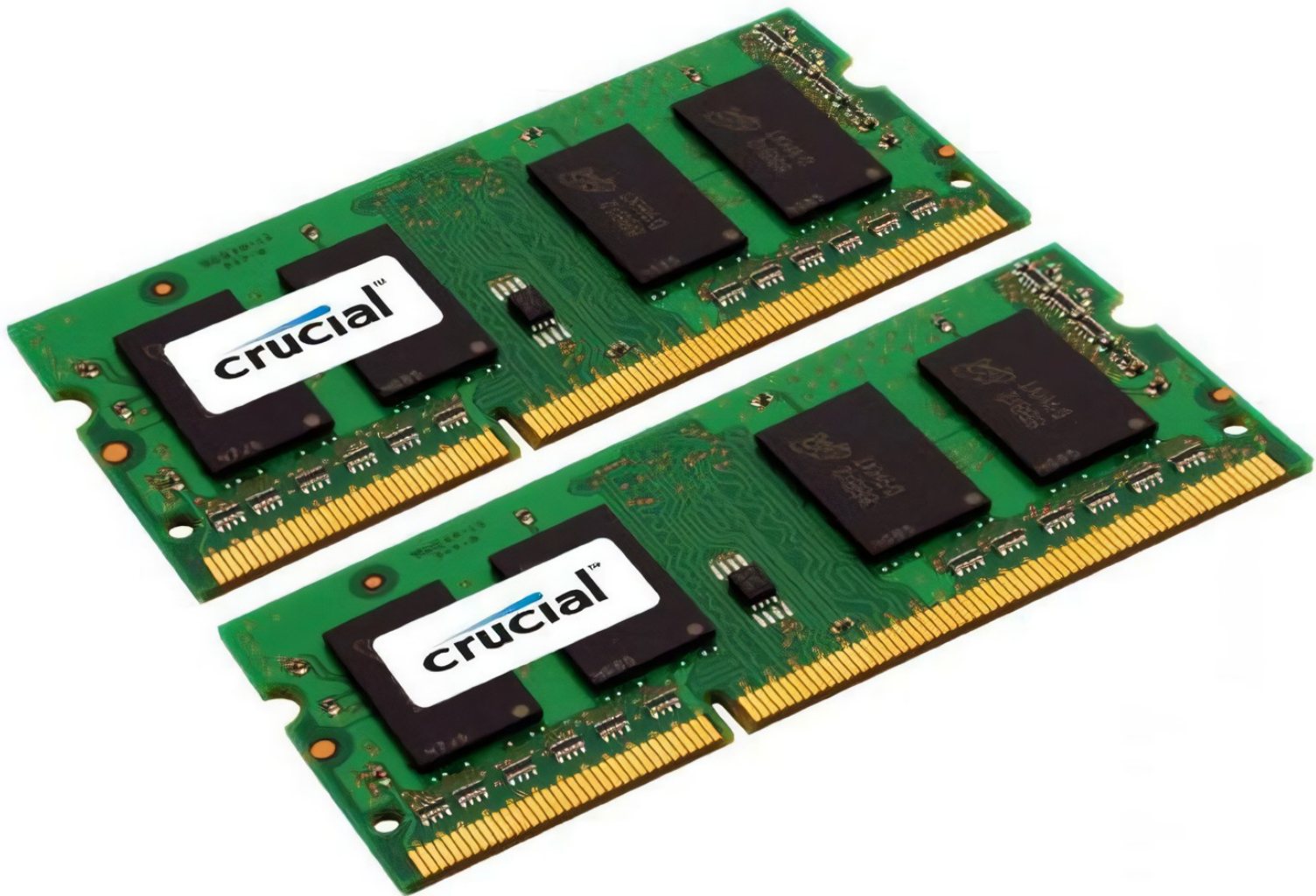
Taiwan

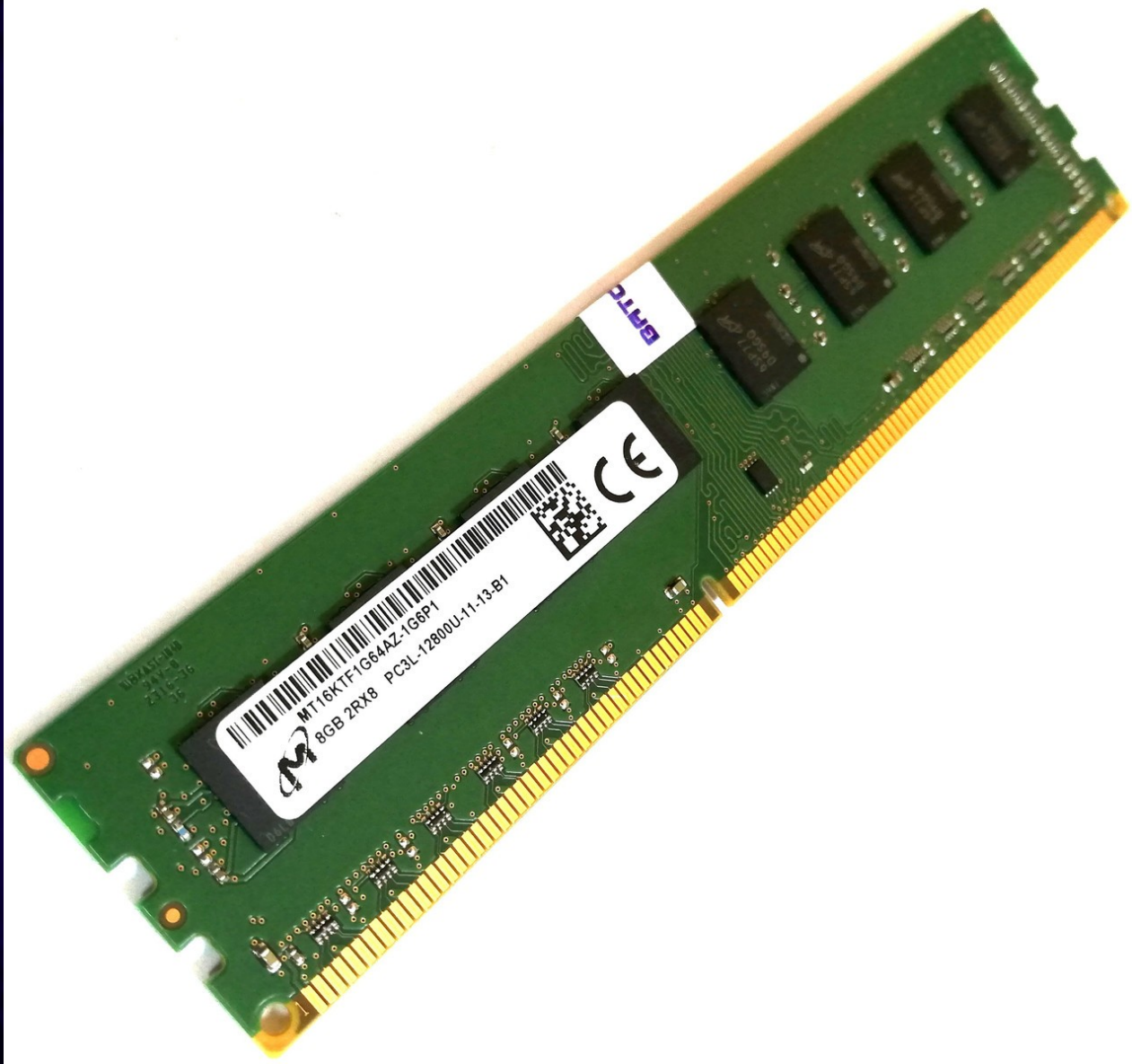


Removal will void Warranty

201320 MT

211271





MT16KTF1G64AZ-1G6P1
8GB 2RX8
PC3L-12800U-11-13-B1

GTRTC





Ellixir
M2U51264DS8HC3G-5T
512MB DDR-400MHz-CL3
PC3200U-30331
Warranty Void If Removed

0542.MN05A1107A.5YM0410N08.XX.CN

Ellixir
M2U51264DS8HC3G-5T
512MB DDR-400MHz-CL3
PC3200U-30331
Warranty Void If Removed

0542.MN05A1107A.5YM0410N08.XX.CN

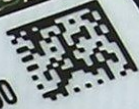




4GB 1Rx8 PC3L-12800SE-11-12-C1
KVR16LSE11/4
1.35V
BSMK0981498
Warranty Void If Removed



9965526-013.A00LF
0000006656791-S000060
EXJFF-B97CKV-VV9N2
ASSY IN CHINA (1)

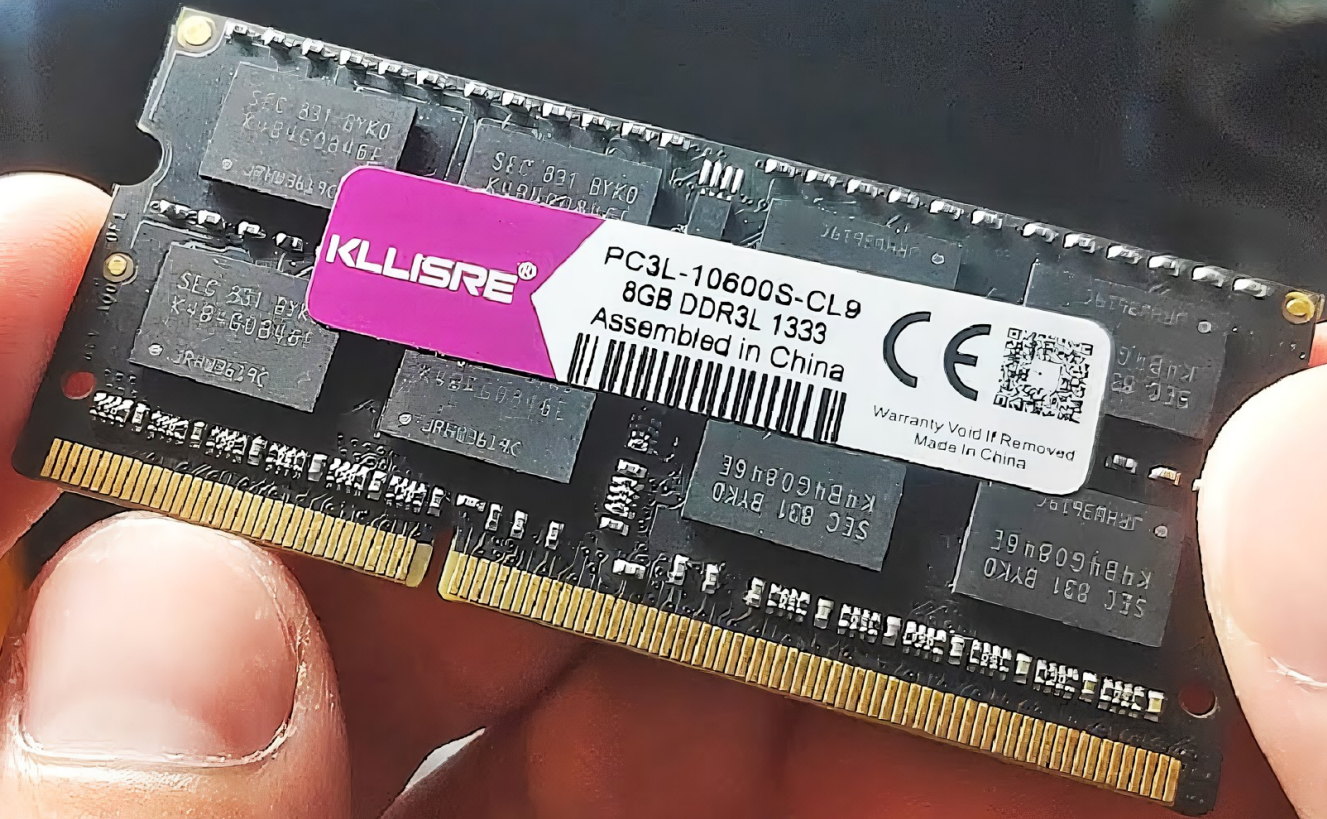




OLD



OVERCLOCKERS.UA



KLLISRE

PC3L-10600S-CL9
8GB DDR3L 1333
Assembled in China



Warranty Void If Removed
Made in China

SEC 831 BYKO
K4B4G0846E

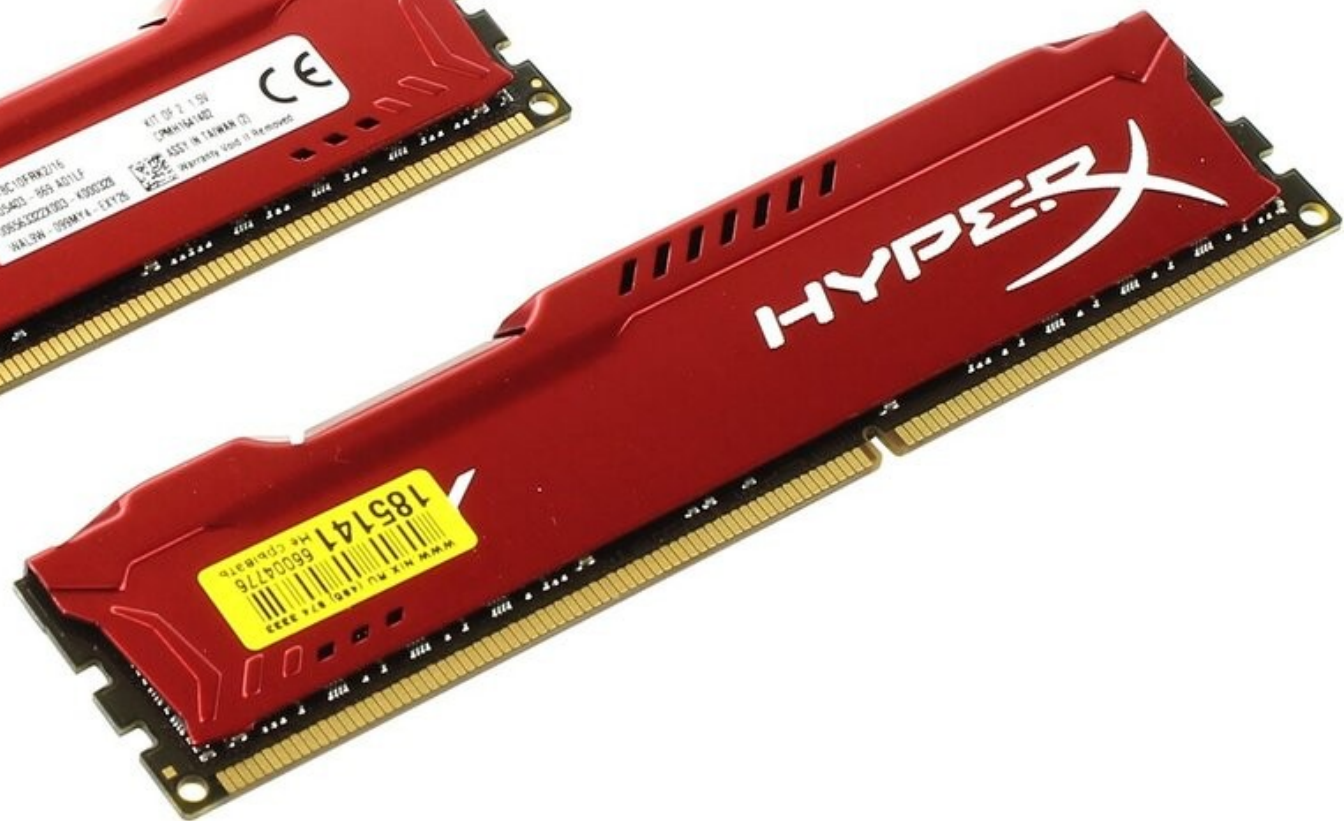
SEC 831 BYKO
K4B4G0846E

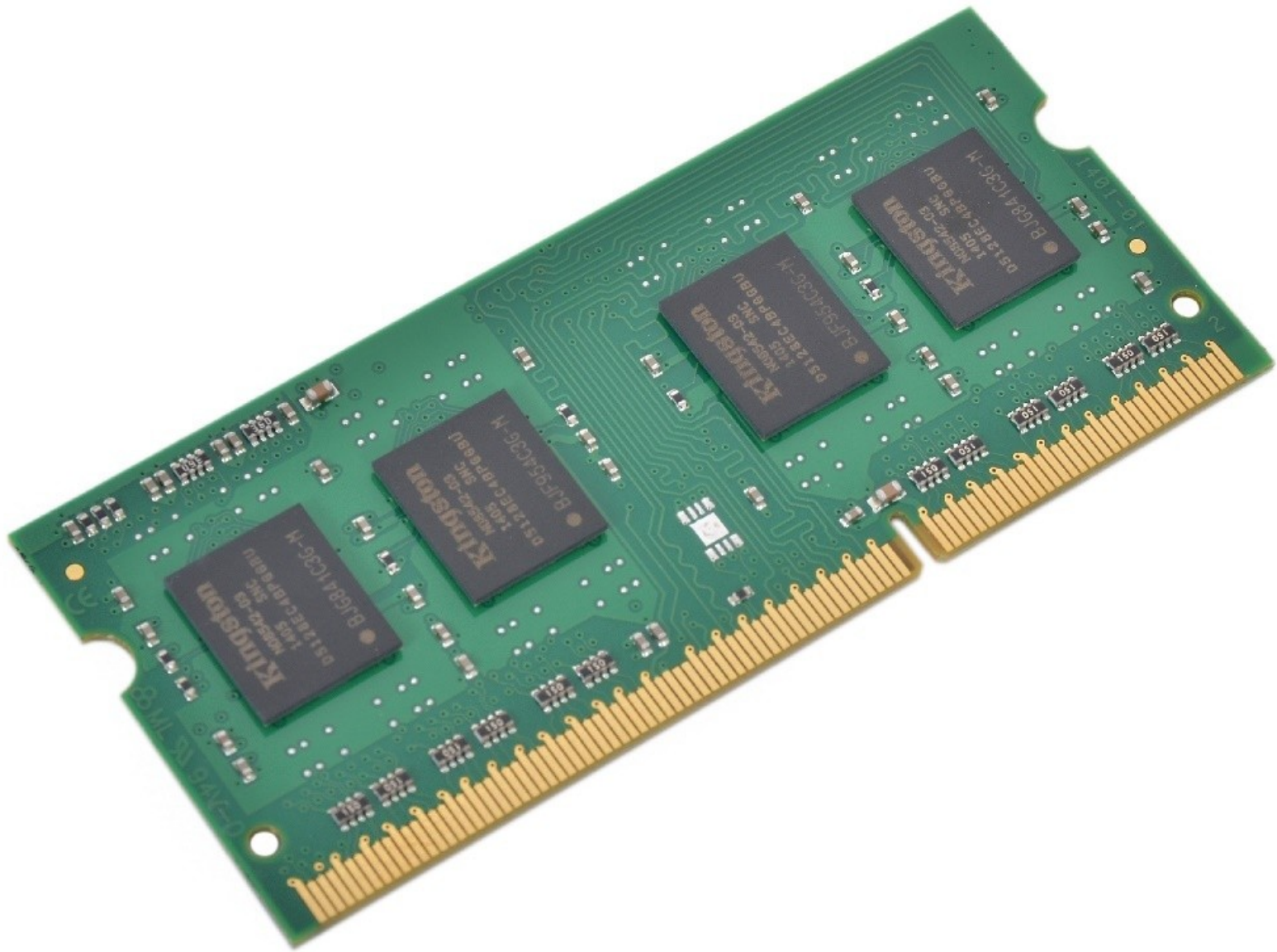
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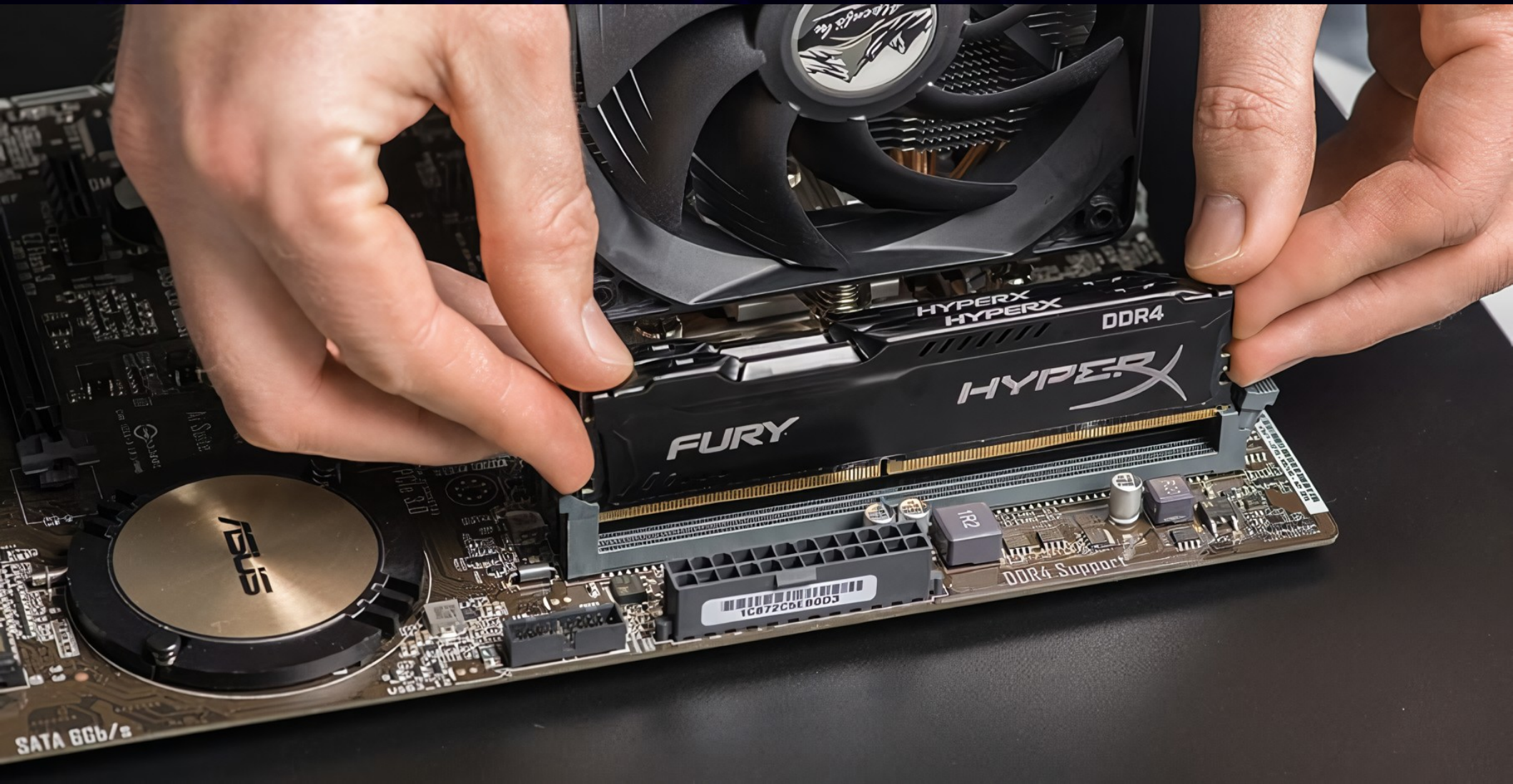
SEC 831 BYKO
K4B4G0846E

SEC 831 BYKO
K4B4G0846E

SEC 831 BYKO
K4B4G0846E



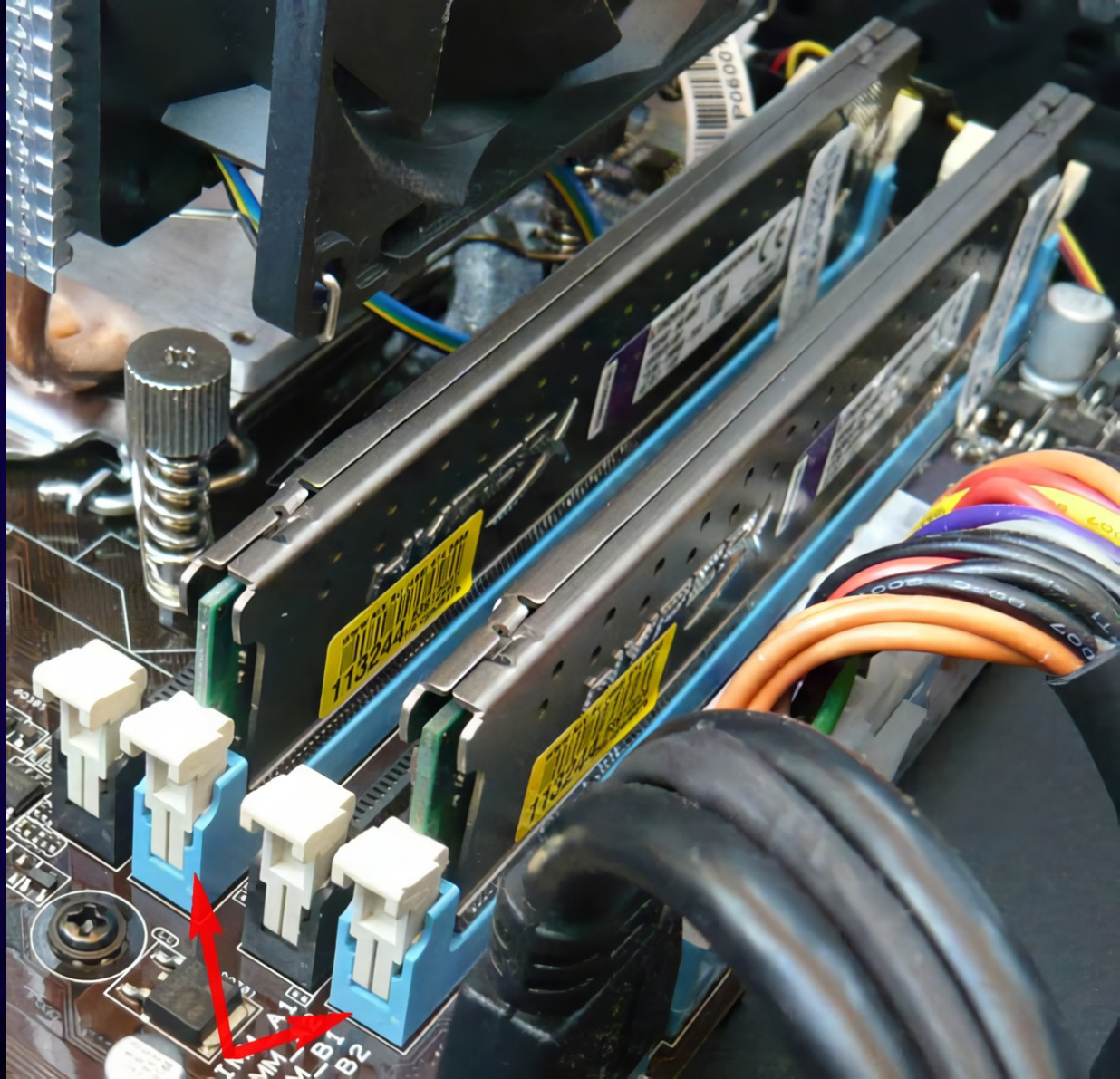






TEC S/N: R020012HCF3
PC8 10600MHz
595: P00025500

0270A





GIGABYTE

CLR_CMOS

CPU FAN



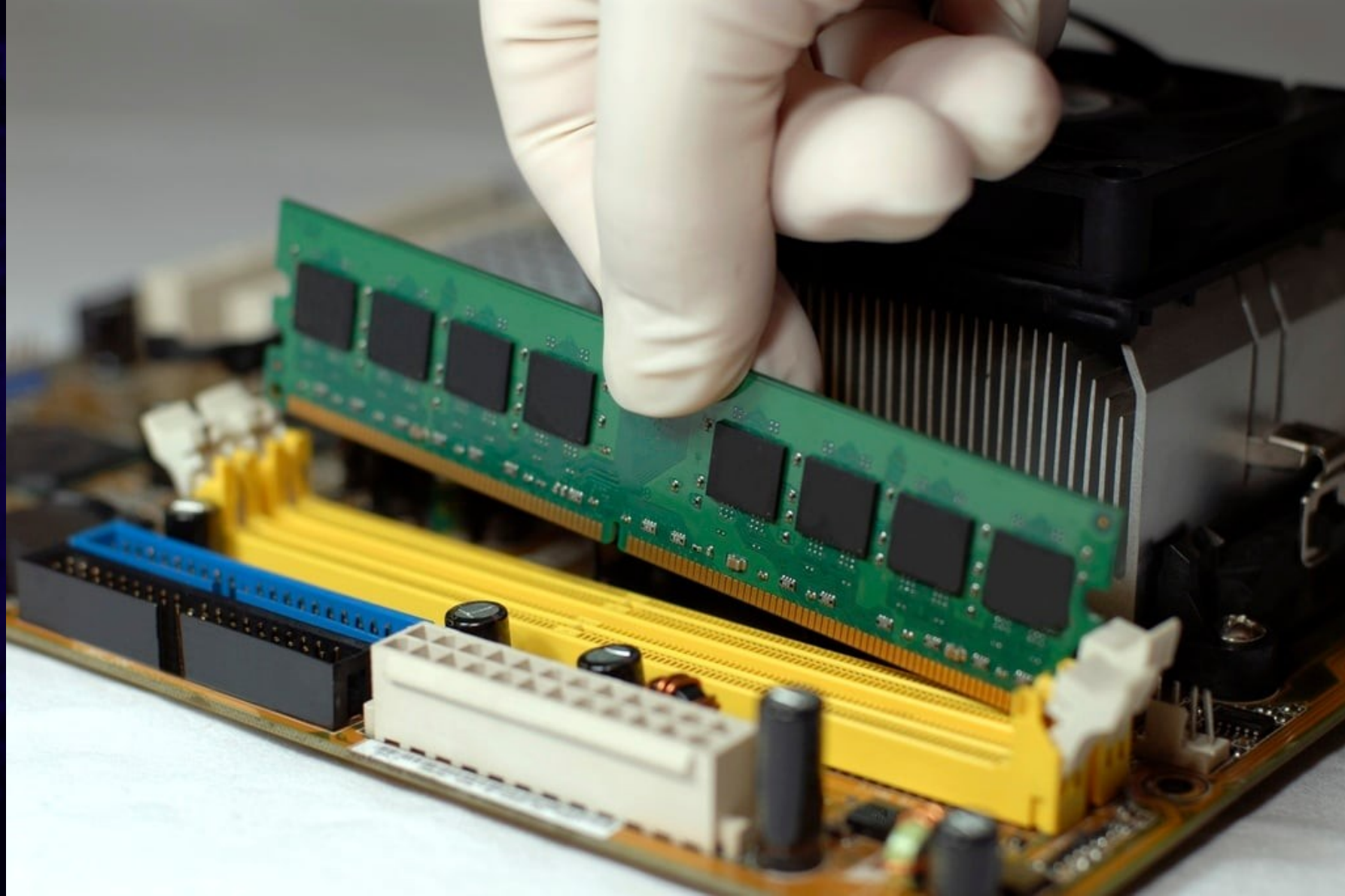
DDR2_2
DDR3_2

D33006



SN143750019078







lenovo
is a registered trademark of Lenovo

FC CE
RoHS
UL
VDE
NOM
N

Lenovo B580
Model Name(Y11P111) 2020H
10 130VPL7 20V-m-4 SA
M 3.2 R/C 4 20V-m-4 SA
Mfg Date 13/03/18
S/N V810900441 P/N 9906290
SKU V8030018 1P
Factory ID: KS
Manufactured for Lenovo
PC Pak, Ltd.eg
Made in China 10912H19250

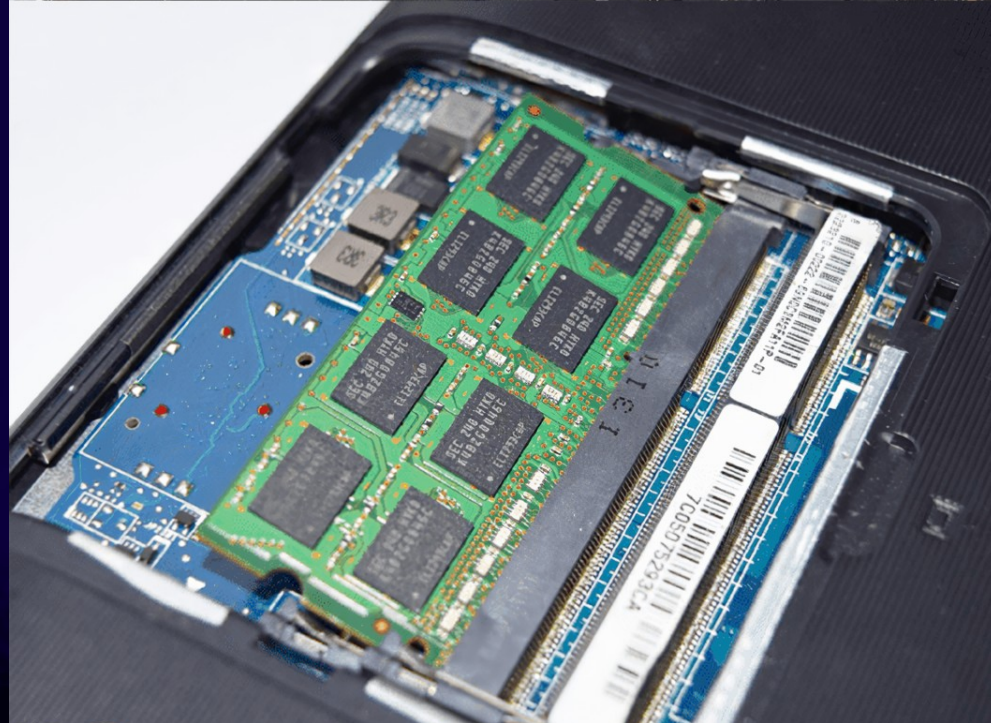
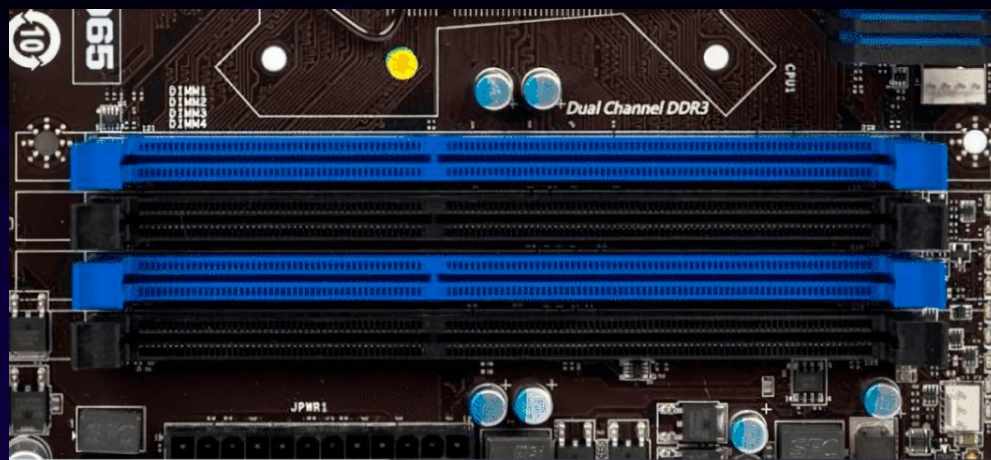
P/N 90M2P00
S/N V810900441 Mfg 08/03/2018 1P

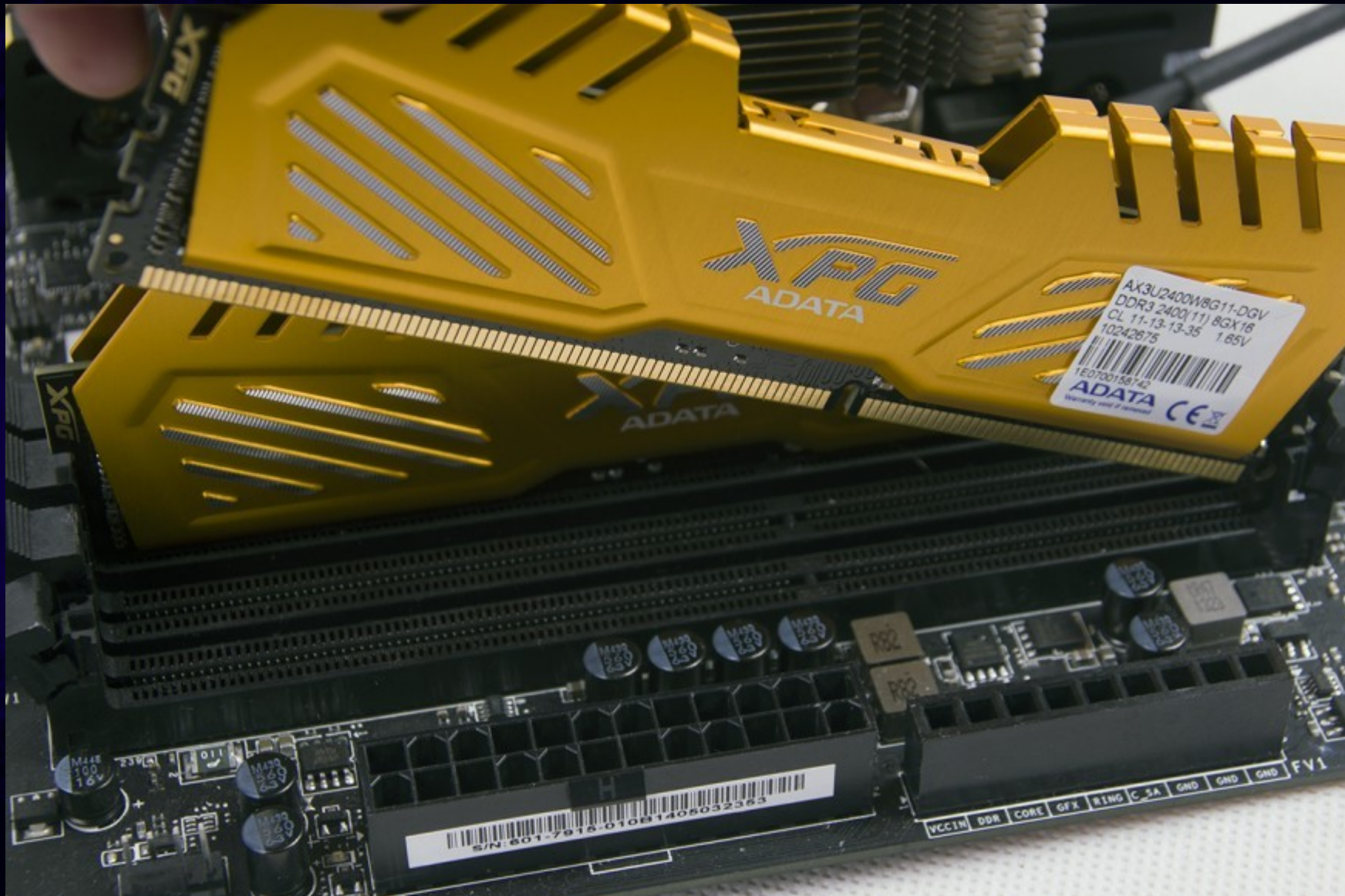
Windows 8

M.2, 5x8

16GB LPDDR4X 1600MHz 16GB 1P
S/N V810900441 Mfg 08/03/2018 1P

44A01.031Q31176D9BK51A



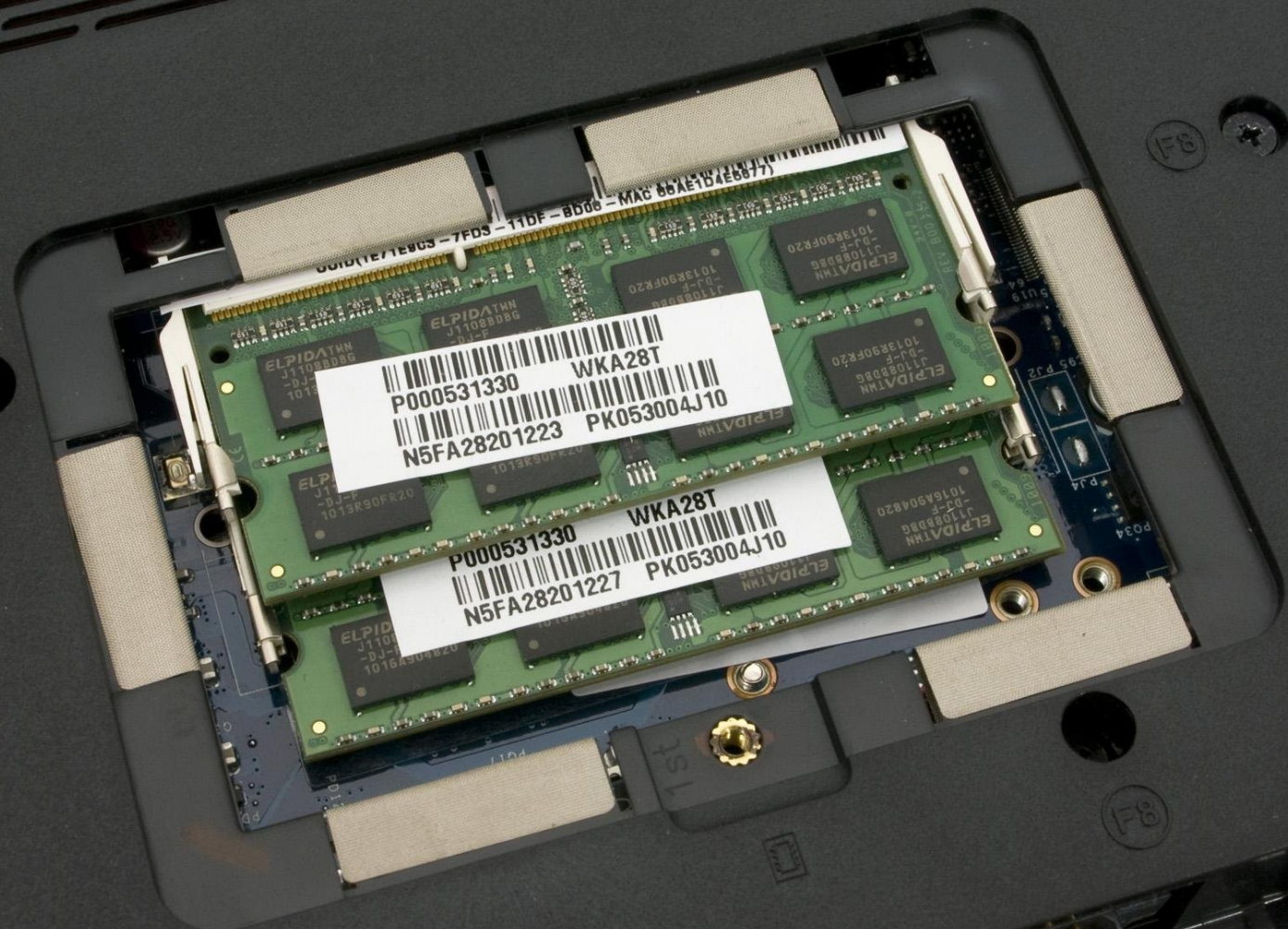


AK3U2400W8G11-DGV
DDR3 2400(11) 8GX16
CL 11-13-13-35 1.65V
10242675
1E0700158740
ADATA
Warning read if removed
CE

S/N: 601-7916-010B1406032363

VCC1N DDR CORE GFX RING C SA GND GND GND FV1

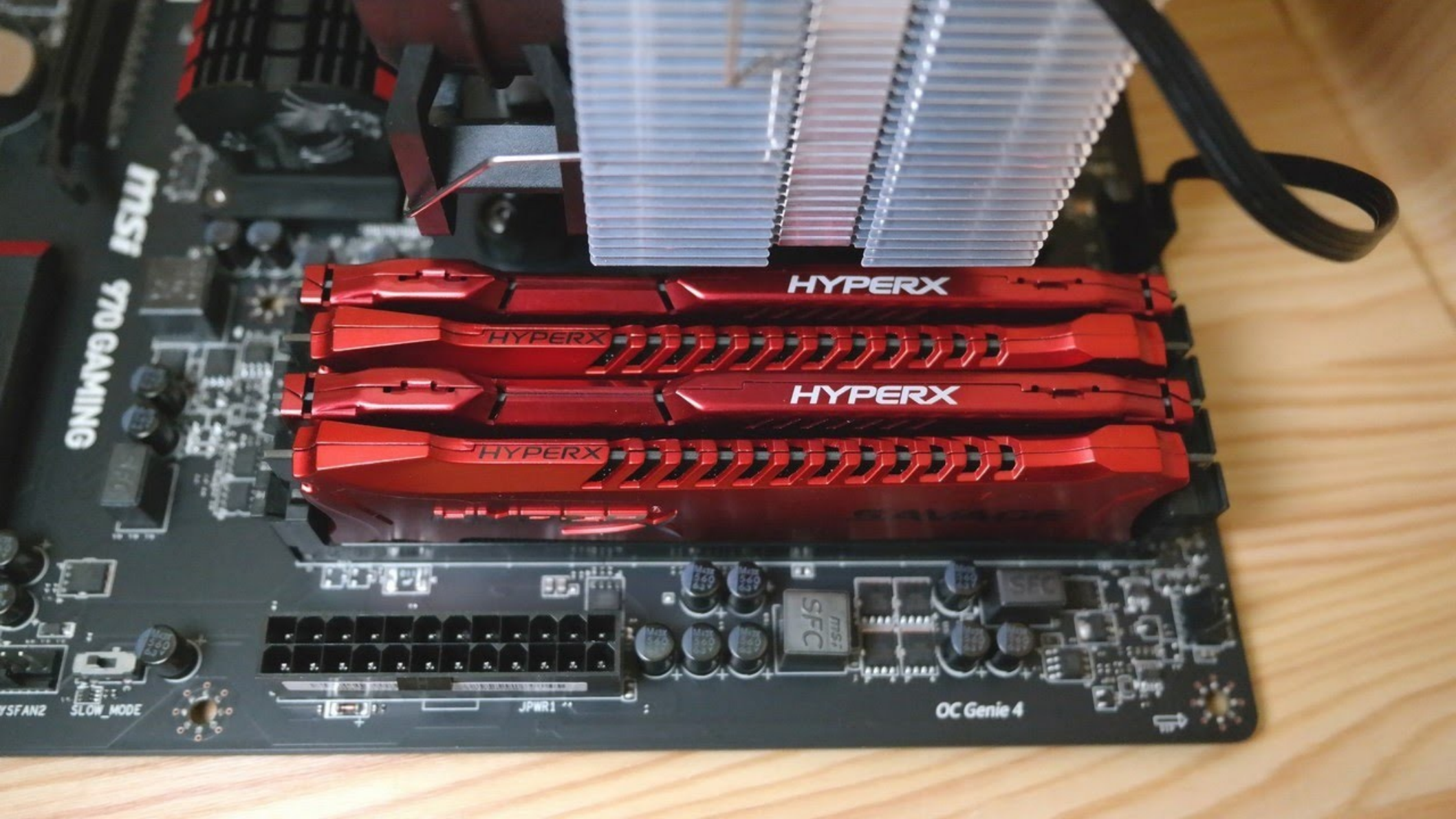
Product Key
7RQBW



P000531330 WKA28T
N5FA28201223 PK053004J10

P000531330 WKA28T
N5FA28201227 PK053004J10





MSI
GAMING
770 GAMING

HYPERX

HYPERX

HYPERX

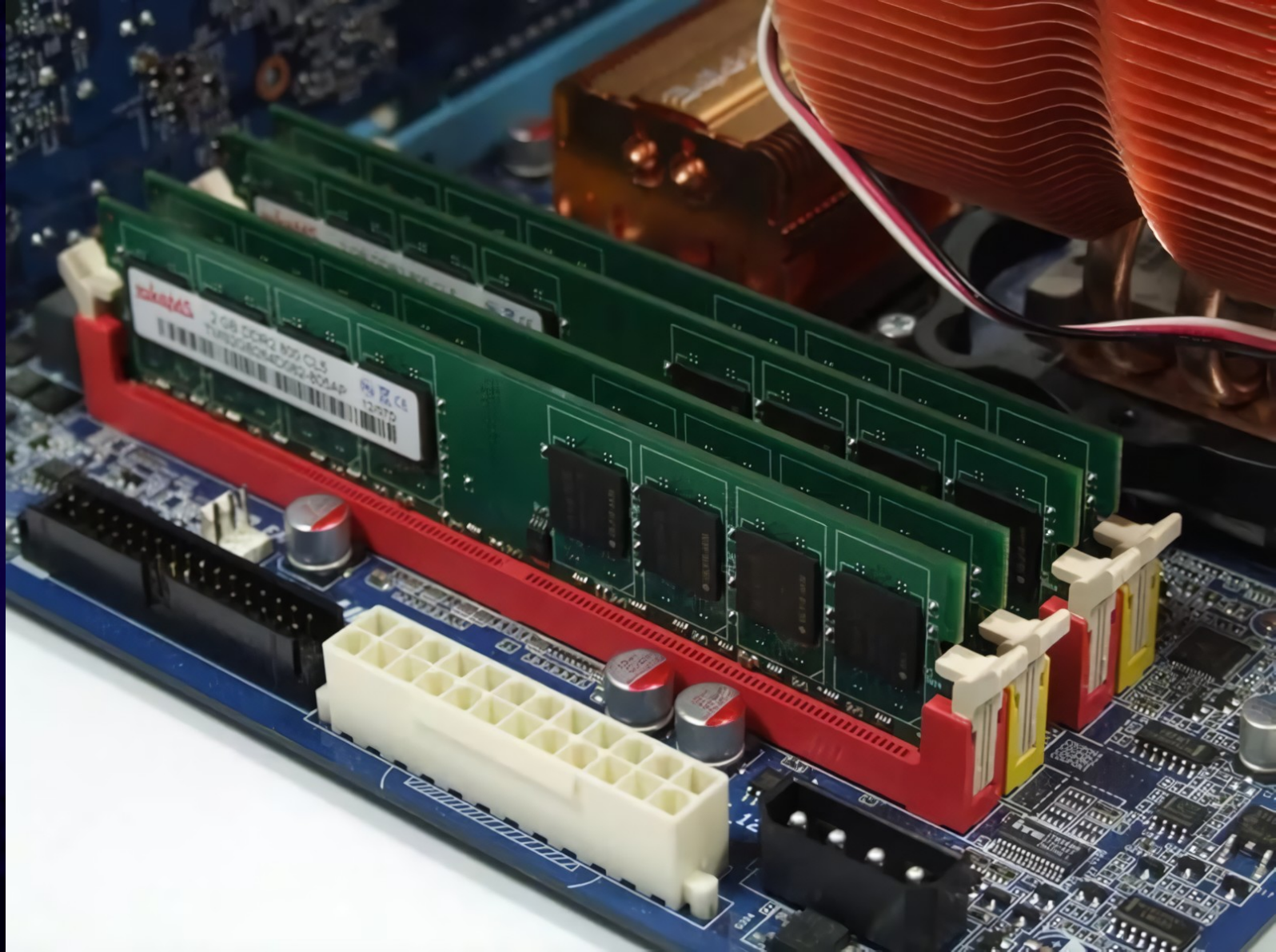
HYPERX

MSI
SFC

OC Genie 4

JPWR1

SLOW_MODE



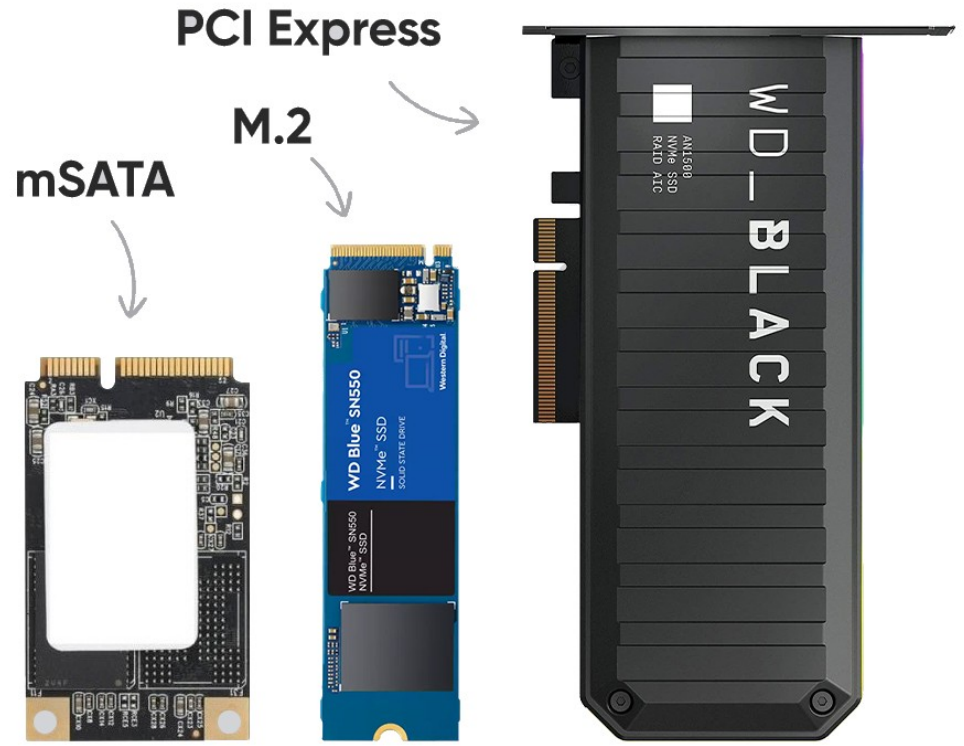
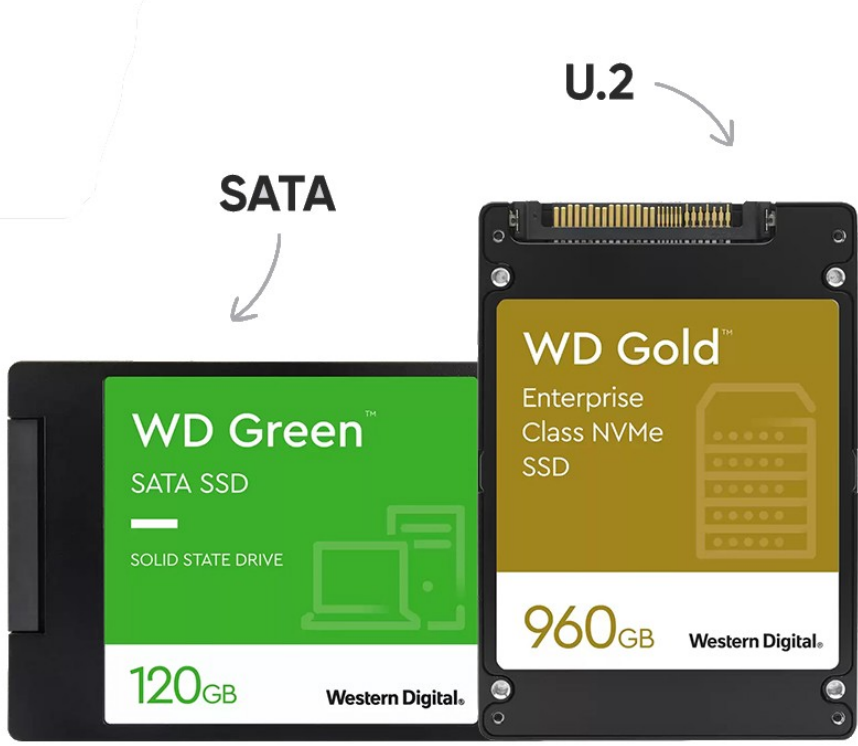
Жёсткий диск



HDD — для хранения данных
(от 500ГБ, скорость вращения
от 7000 об/мин, SATA 2 и
более)

SSD — для программ и
системы
(от 250ГБ, SATA 3 или NVMe)







1TB



WD10PURZ

Designed for
24x7 systems



- Built for 24x7
- Supports up to 64 cameras
- Enhanced Workload Rating

WWN: 50014EE20E022981
DATE: 29 MAY 2011
DCM: HNNN13AHB
DCV: J40 JB 1073
S/DCE: 0 70A
T2/DCE: 0 55A
R/N: 8000009
Product of Thailand

S/N: WCC4J1UJ3YJP
MCL: WD10PURZ-85U2XYD

U.S. Particle: 6178995
WD NL B.V. - Leidschendam 5, 2132 LS Hoedorp NL
CAN ICES-3 (B) NRB-3(B)
Do not cover any drive holes



Product warranty will be void if seal, label or cover is removed or damaged.



WD Purple™
Surveillance Hard Drive



Western Digital
www.westerndigital.com

500GB

WD-RZ3
SATA 16MB Cache
WD5002ABYS

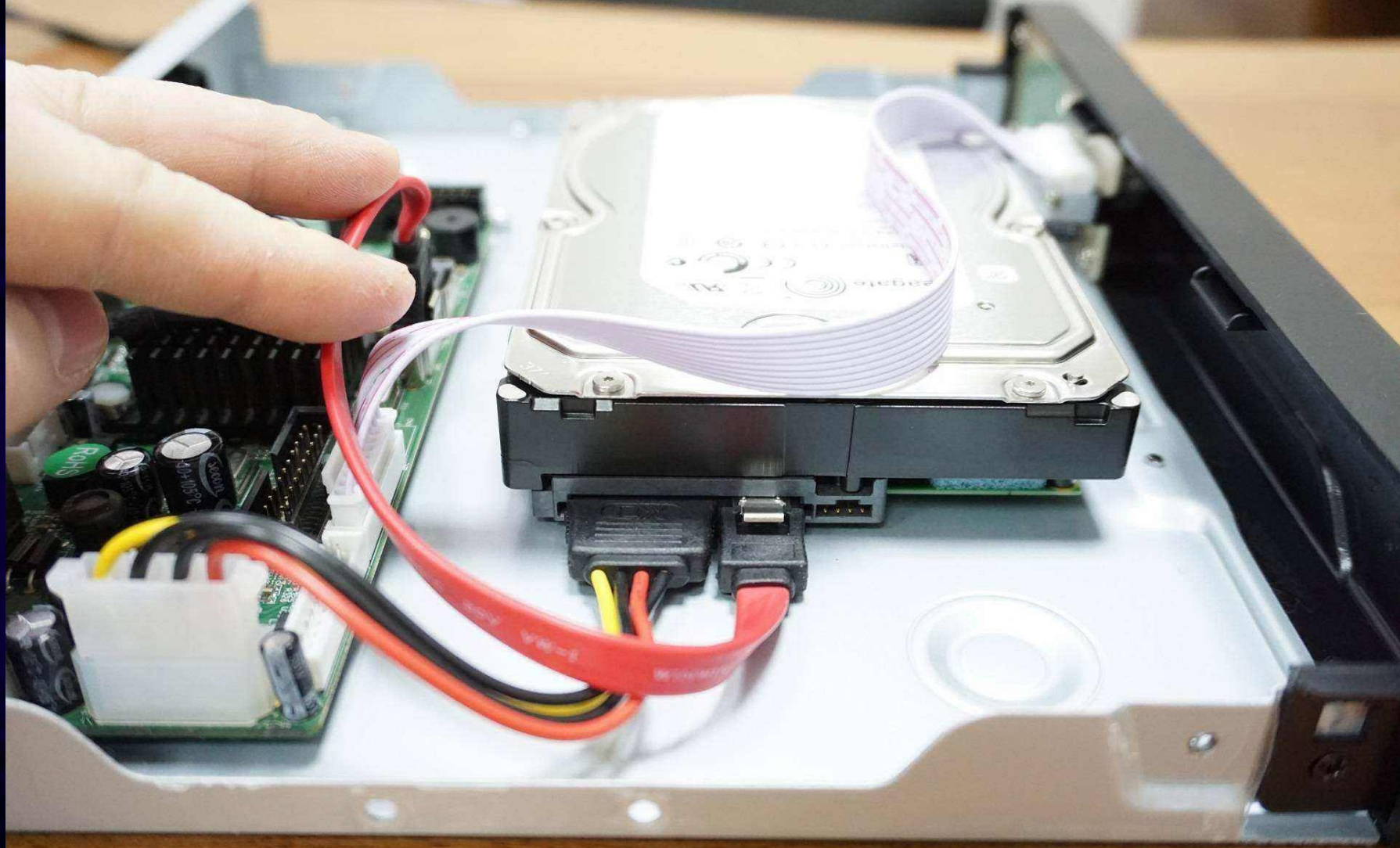
MDL : WD5002ABYS-02B 60
S/N : WCASY7655063
LBA : 976773768
DCM : 1ANNN12MGB
U.S. Patent: 678056, 5655195, 6299484, 6263459
Canada ICS-003 Class B
NMB-003 Class B
DATE: 23 SEP 2009
Product of Thailand

5VDC : 0.68A
12VDC : 0.55A
R/N : 701537
W01-701537(B)

Enterprise Storage

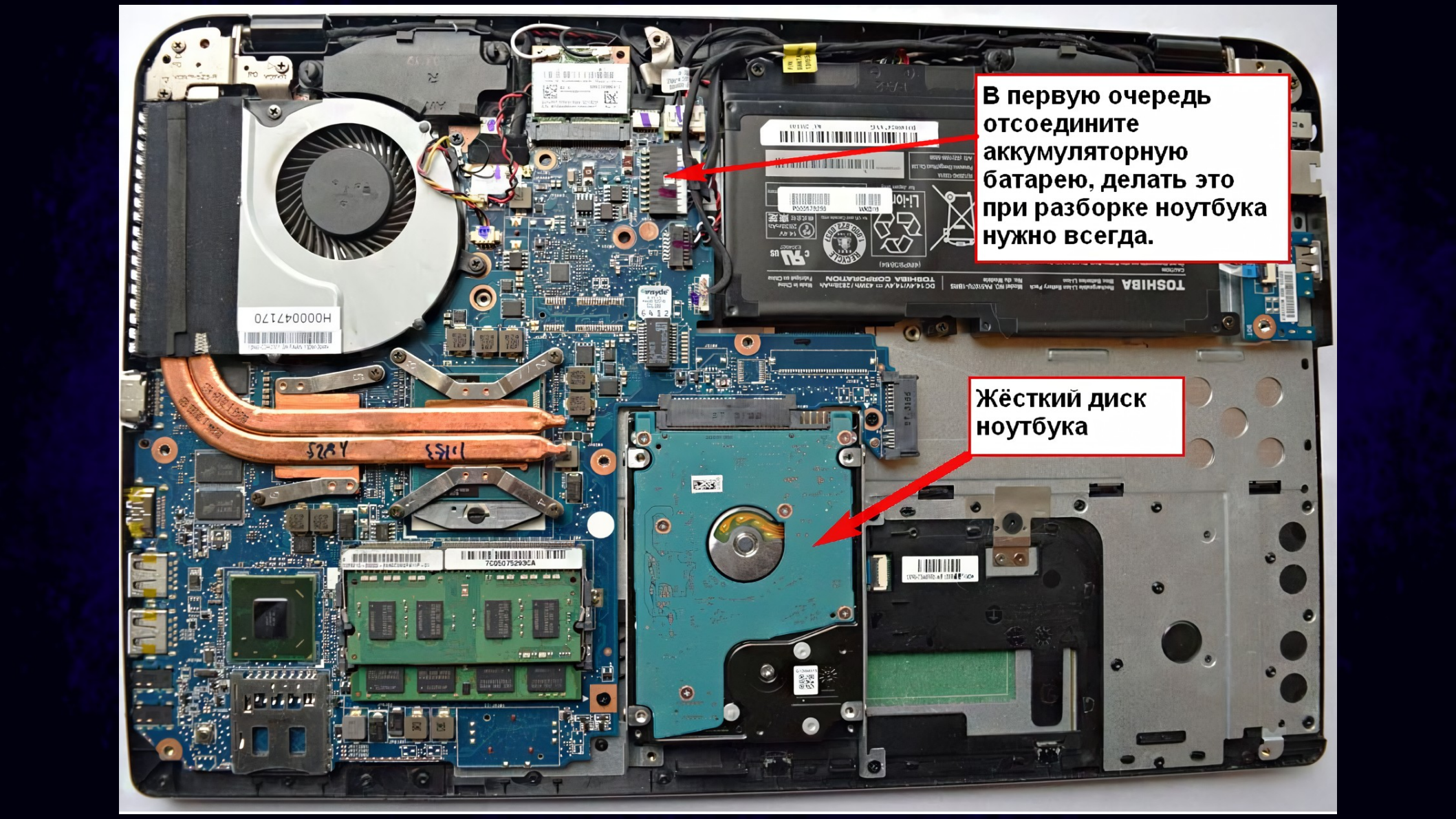
CE RoHS AIA CE





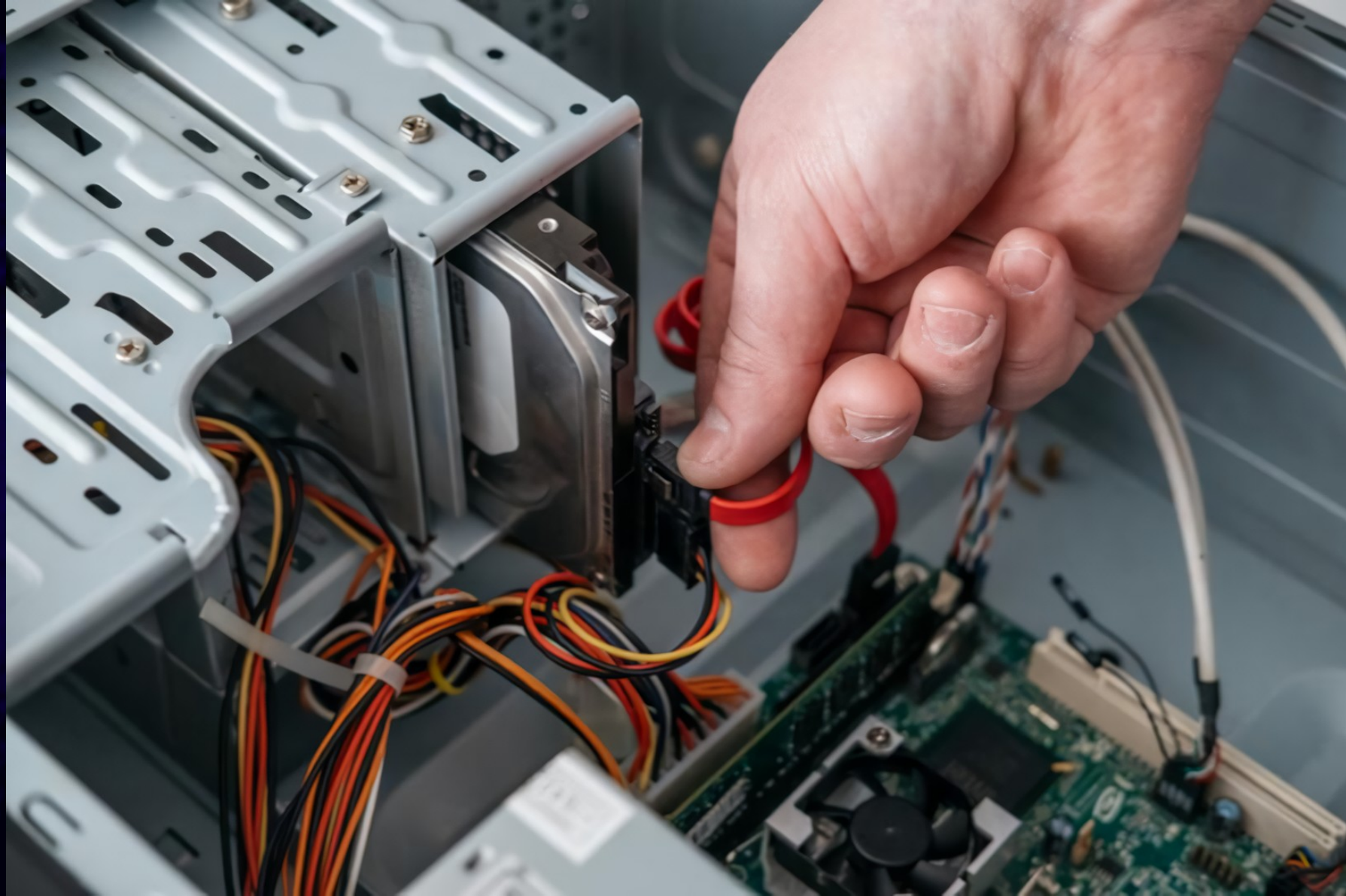




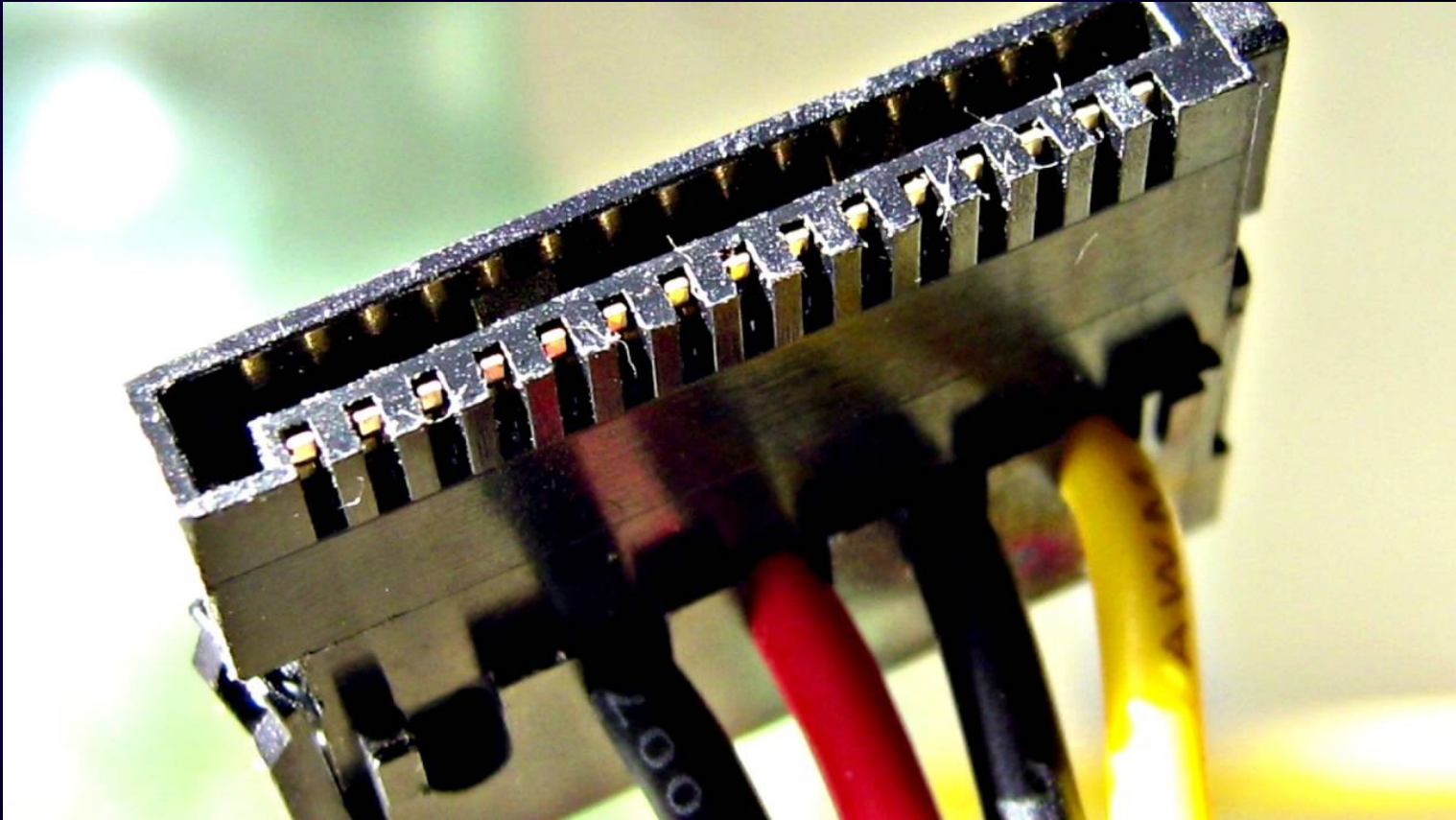


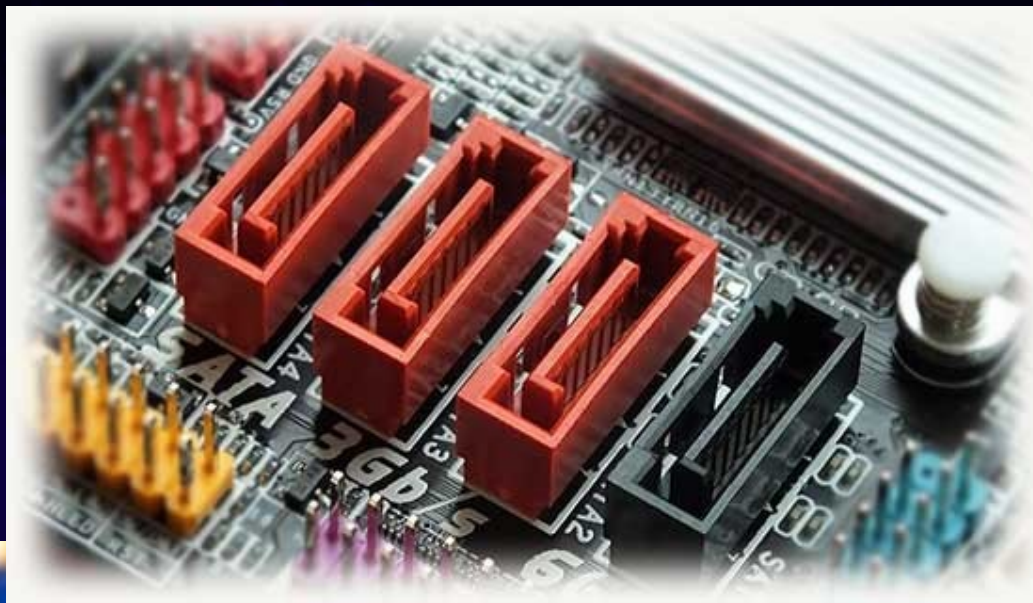
В первую очередь отсоедините аккумуляторную батарею, делать это при разборке ноутбука нужно всегда.

Жёсткий диск ноутбука









Форм-фактор SSD



2280



2260
M.2



2242



mSATA



SATA 2.5"



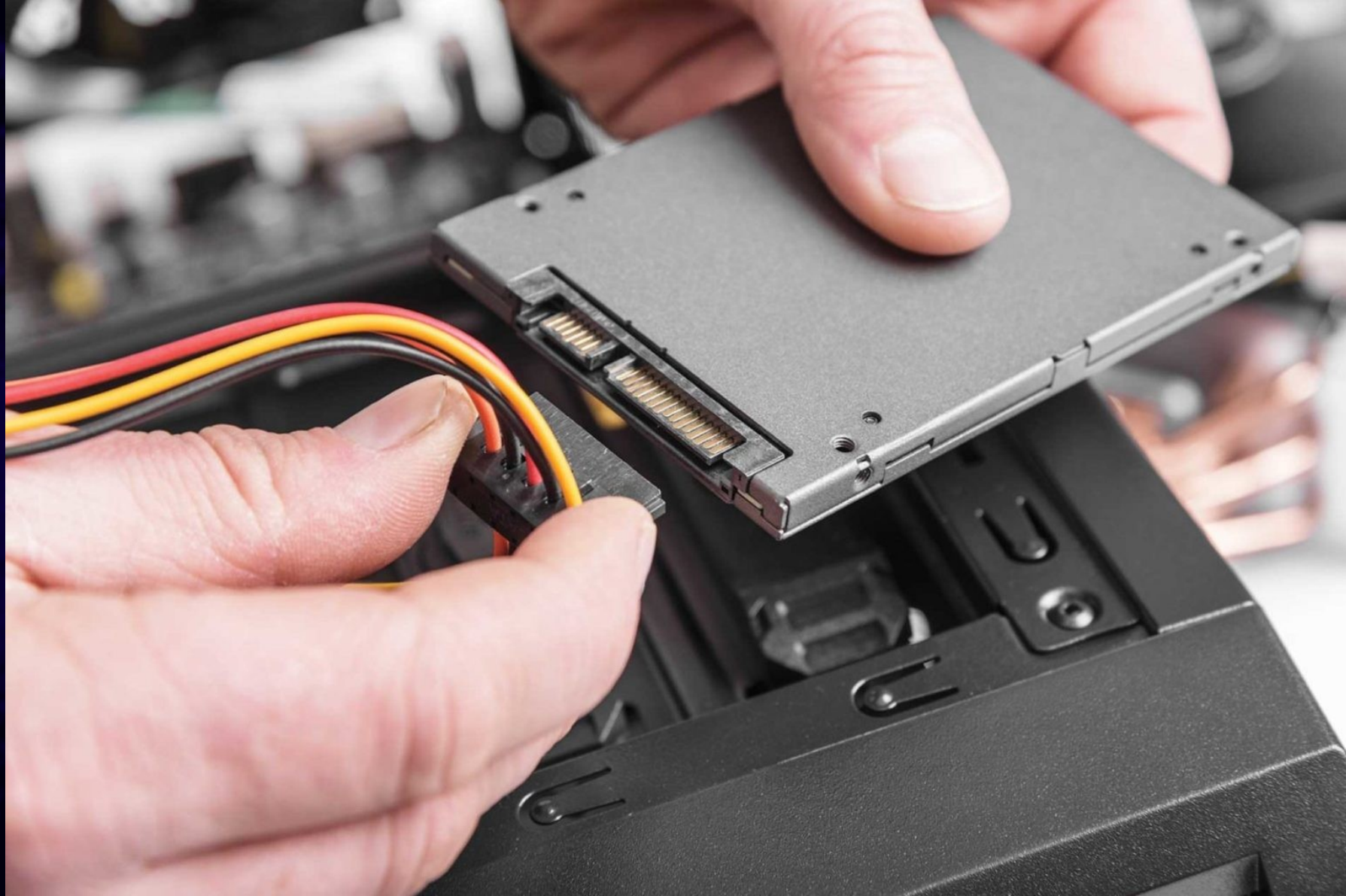


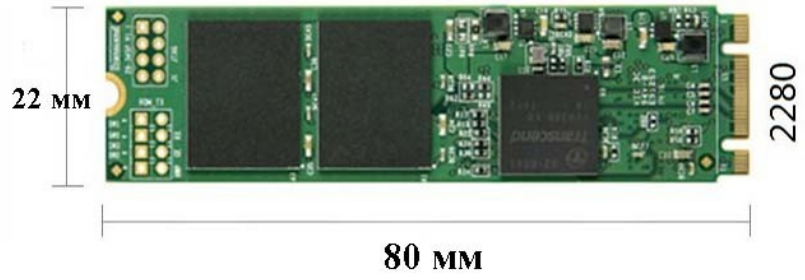
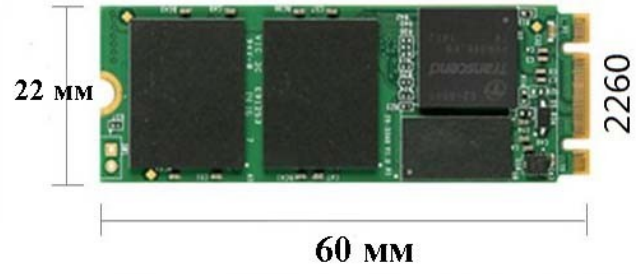
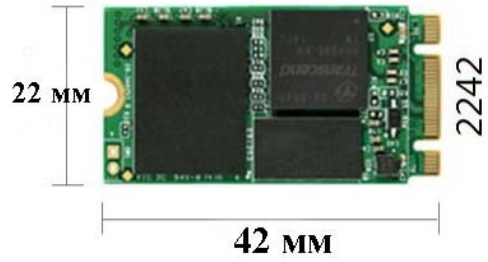
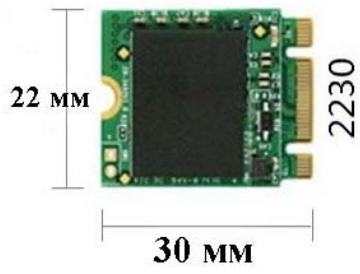


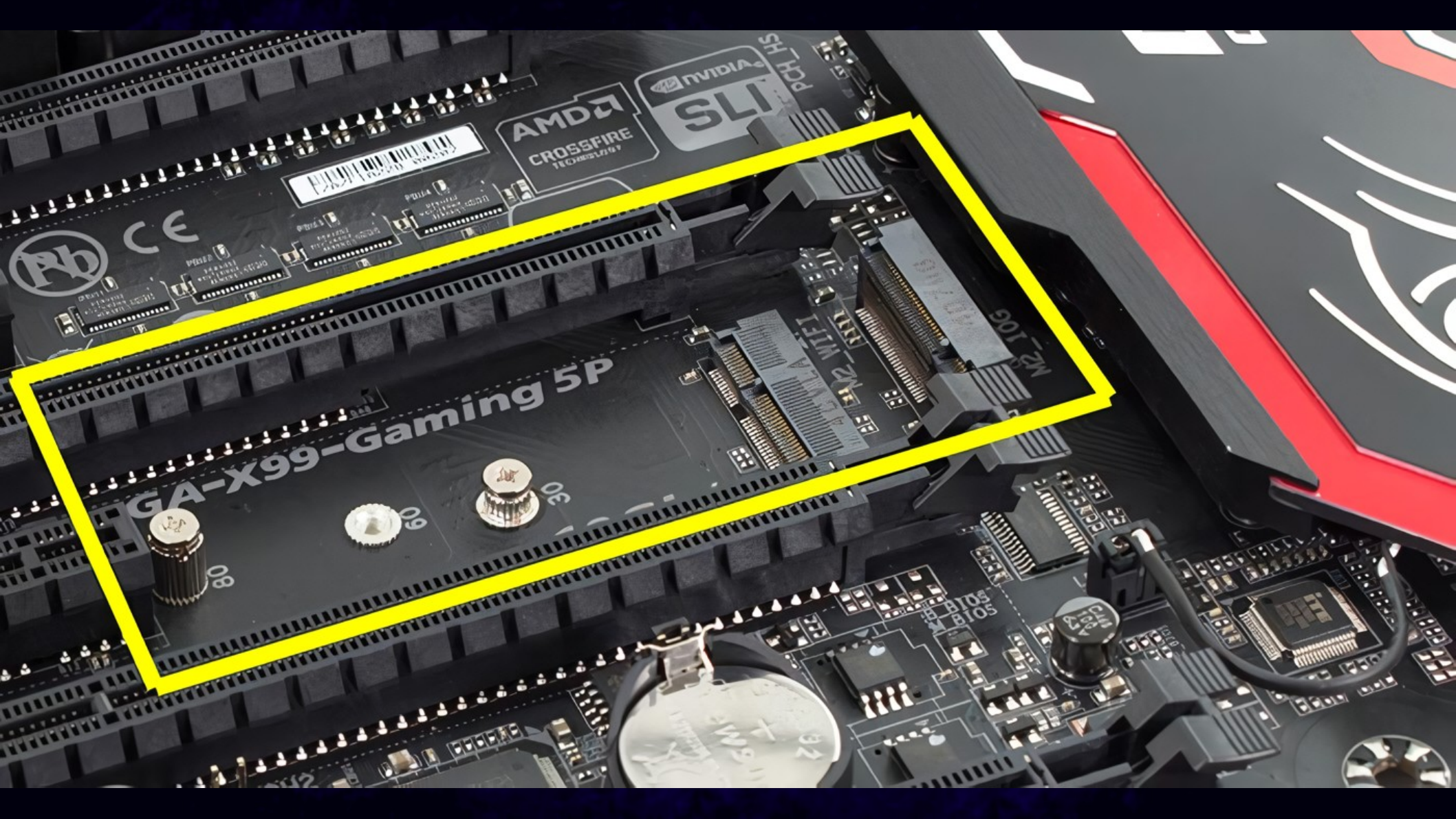
Model: SSDSA25H064G1GC 2.5"
3Gb/s SATA SSD 64G 5V 1A
FW: 8860
Warranty: WARRANTY VOID IF ANY LABEL/
SCREWS REMOVED OR BROKEN
WWN: 5001517959662801
Serial ATA
Ph-free 2LJ
Made in China
PBA: E46521-903
Sa: E36514-906
LBA: 125,045,424
ISN: C1E6M134200R4054KGN
CN: C1E6M134200R4054KGN
C1E6M134200R4054KGN

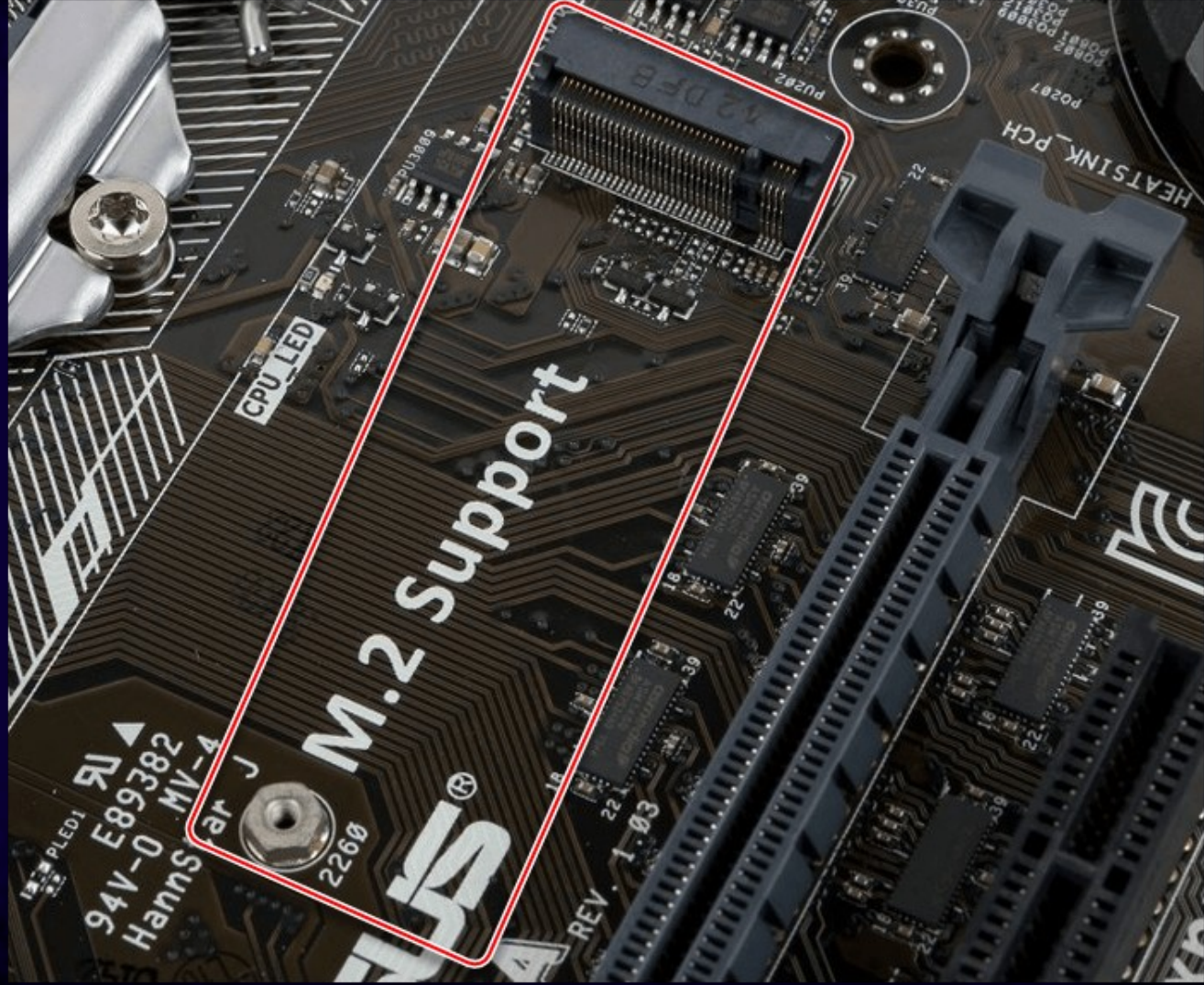
Disclaimers and Regulatory Markings:

- RoHS (Restriction of Hazardous Substances)
- REACH (Registration, Evaluation, Authorization and Restriction of Chemicals)
- UL (Underwriters Laboratories)
- CE (Conformity with European standards)
- CCC (China Compulsory Certification)
- N232 (RoHS exemption)
- WEEE (Waste Electrical and Electronic Equipment)
- 20 (Recycling symbol)











SD6SN1M-256G
FW: K230500
SanDisk
SSD X110 Rated 3.3V ~ 2A
N17819 D33724
S/N: 132202401171
KCC-REM-TAD-SD6SN1M
Made in China

SD6PP4M-256G-1002
FW: A200100
SanDisk
ES
SSD A110 Rated 3.3V ~ 2.5A
XXXXXXXXXXXXXXXXXXXX
S/N: 132287400061
KCC-REM-TAD-XXXXXXXXXX
Made in China

SanDisk
Rated: 3.3VDC 0.35A
Capacity: 032GB
FW: U218000
SDSA6MM-032G
SN: 132378400189
WARNING: Product can be damaged by Electrostatic Discharge (ESD)



V-NAND SSD
970 PRO
NVMe M.2

SAMSUNG ELECTRONICS CO., LTD.

512GB

P/N: MZVKB512HAJQ
Model: MZ-V7P512 2018.00
PBID: U9PQ98GYL4C6HQVAUGC7J7QY4XVBU3Q6
S/N: S463HF0K808406W RATED: DC+3.3V --- 2.9A
EU164: 0029385851B21ACF R-REM-SEC-MZ-V7P512

SAMSUNG

XPG

M.2 2280 SX6000PNP 512GB

ASX6000PNP-512GT-C

S/N: 2G0123456789



額定電壓: 3.3V



MADE IN CHINA
WARRANTY VOID IF REMOVED

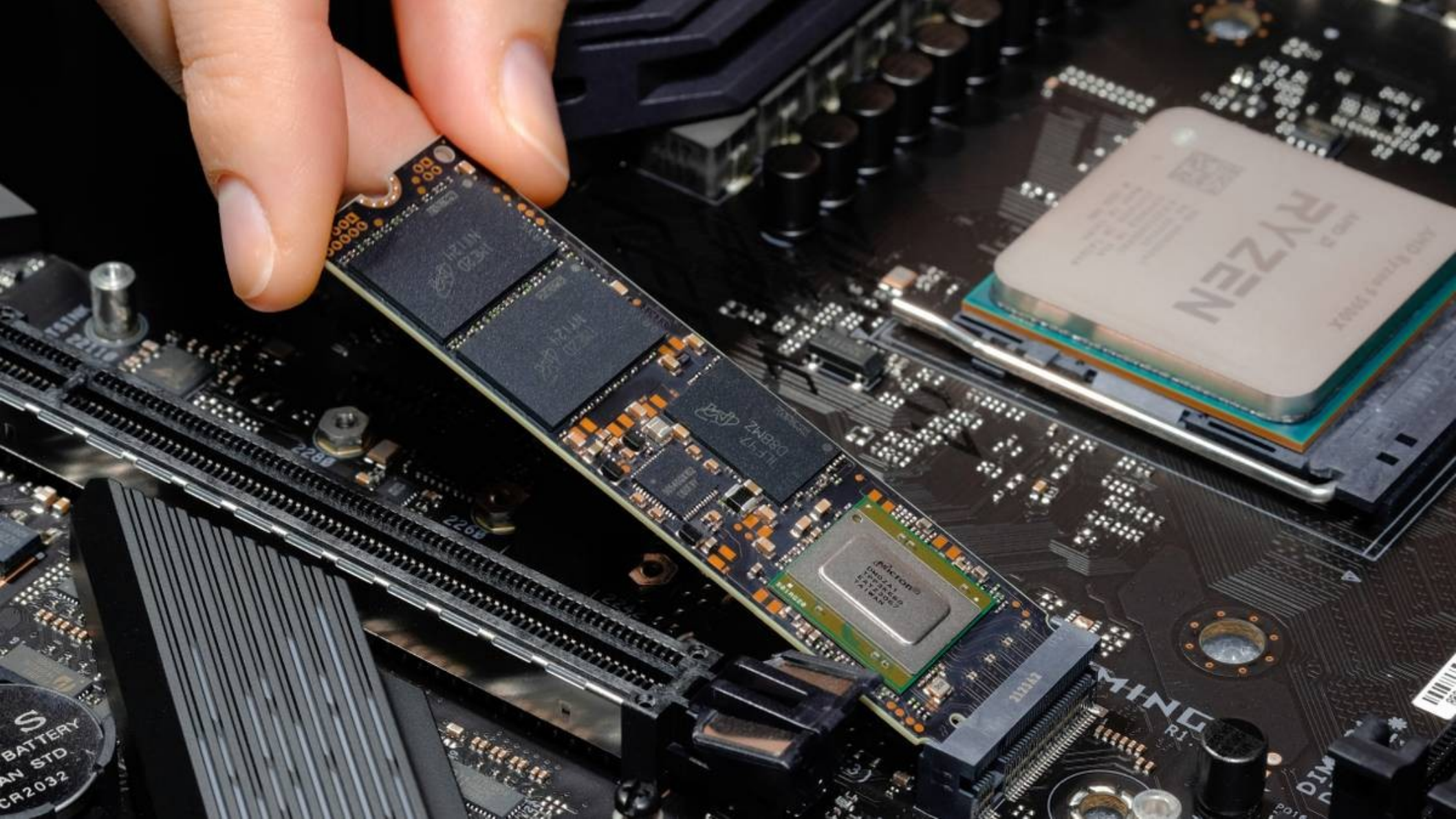


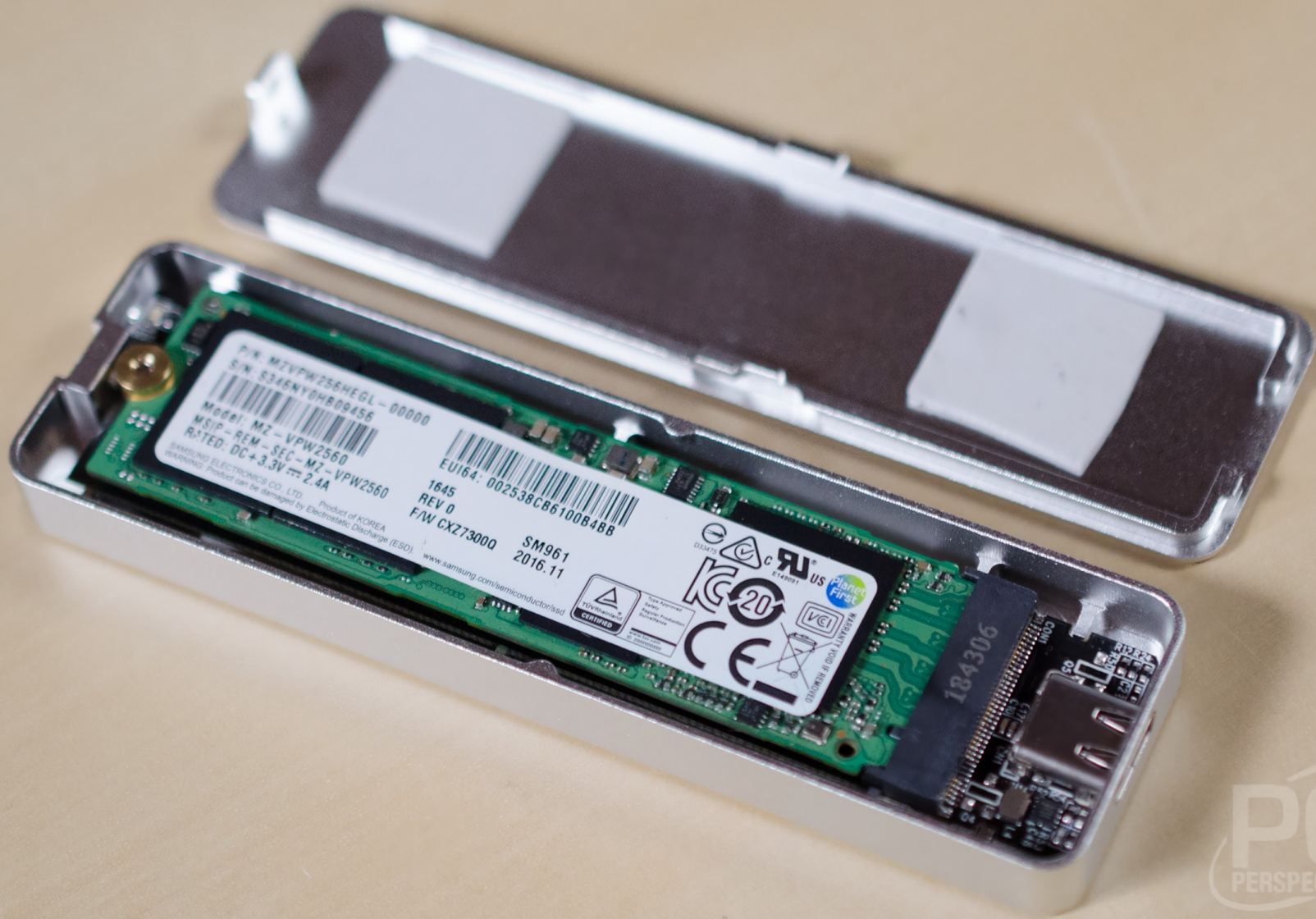
WD RED™ SA500 NAS SATA SSD

www.wdc.com

Western Digital®
WD RED™
SA500
NAS SSD







Видеокарта

Разрядность шины
памяти
(от 256 bit)

Объём памяти
(от 4ГБ)

Питание
(питания может
быть 6 или 8,
или 6+2 пиновый
разъём)



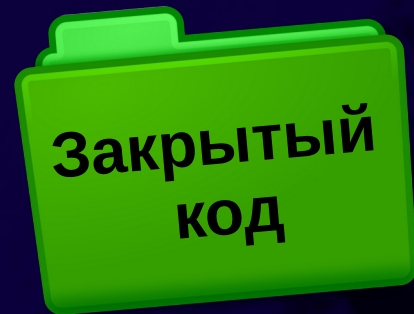




NVIDIA

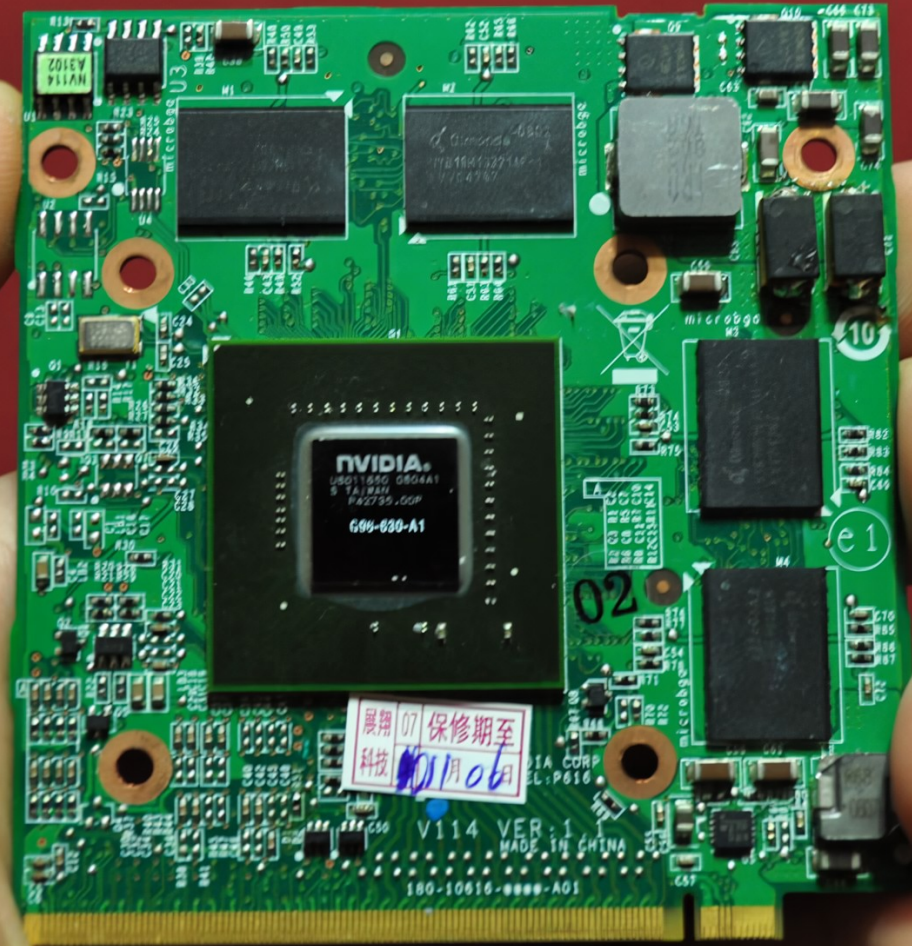
Документация
кода











限期 07 保修期至
科技 10月06日

V114 VER: 1
MADE IN CHINA
180-10610-0000-A01





GEFORCE RTX

GameRock

PALIT

PALIT

PALIT

REPUBLIC OF GAMERS
EST. 2006



TOP
M_102BIT
PCB MADE IN CHINA

ASUS

N1 SE-001-LP-K1

R370
1213F

R370
1213F

R370
1213F

R370
1213F

R370
1210F

R370
1210F

P293106

H7709

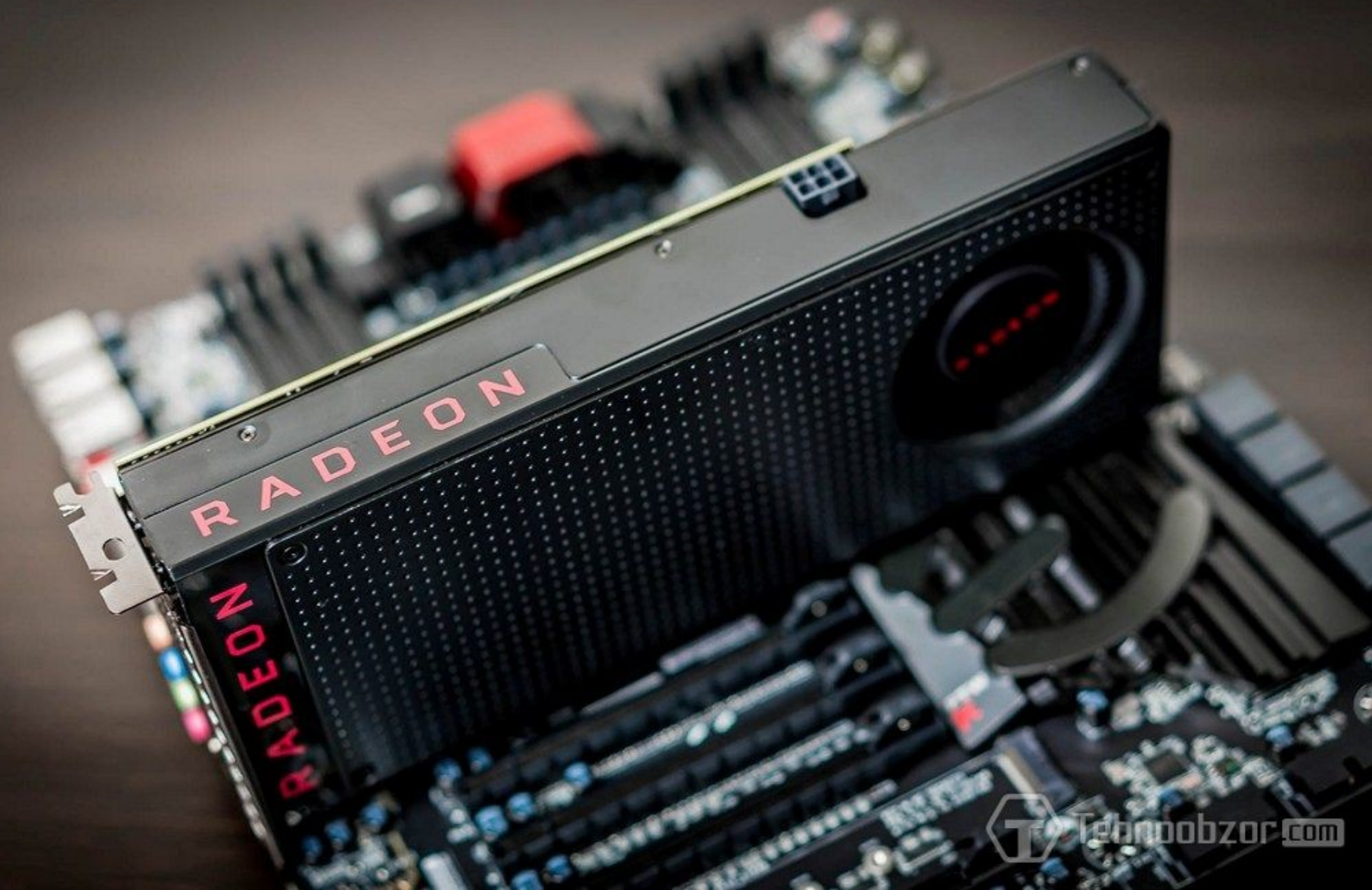
H7711

H7704

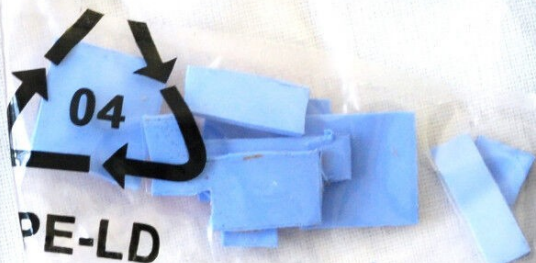
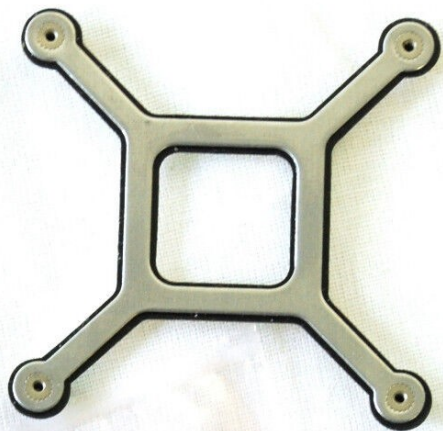
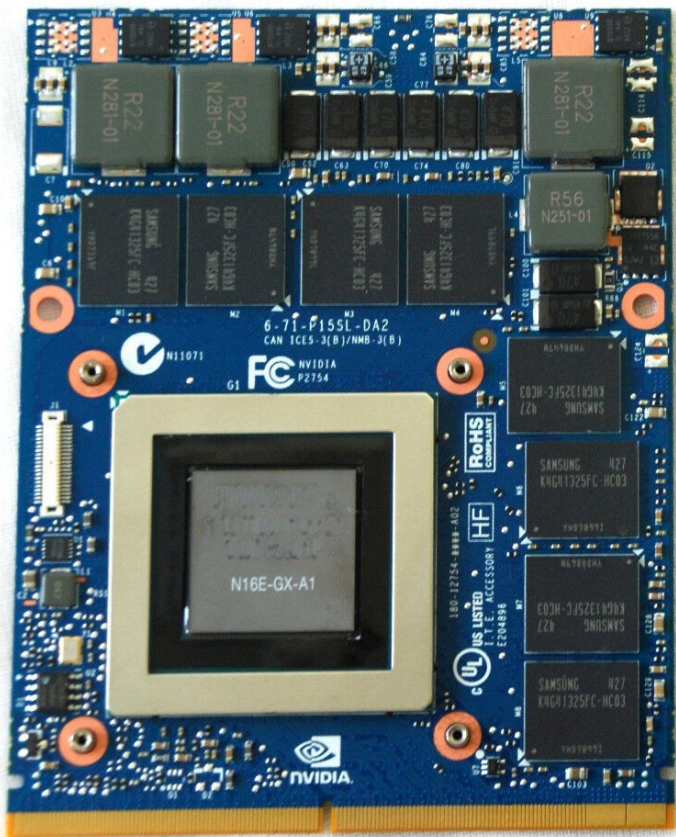
H7708

PCB1810F









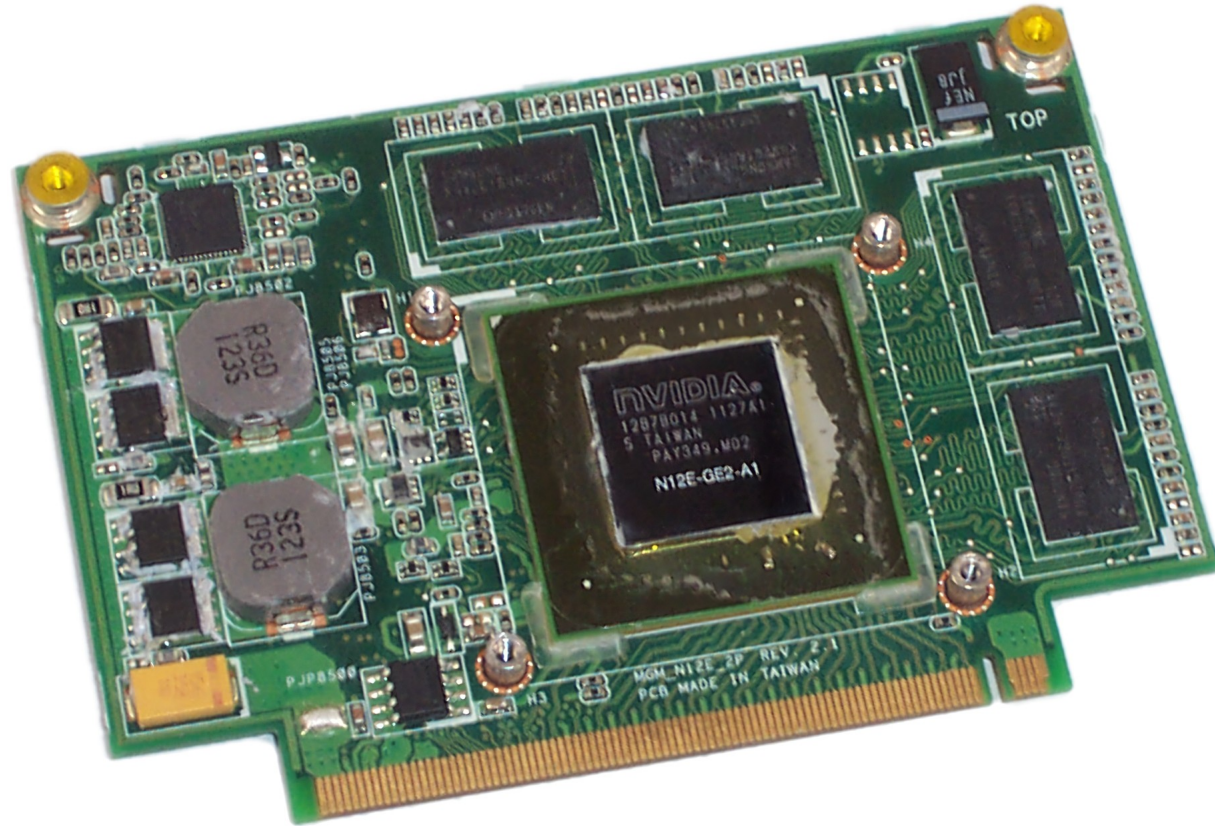


RADEON

109-010237-00C_02

FC UL
ATI RADEON R9 290X
ATI Technologies Inc. EMS
Made in Taiwan

109-010237-00C_02

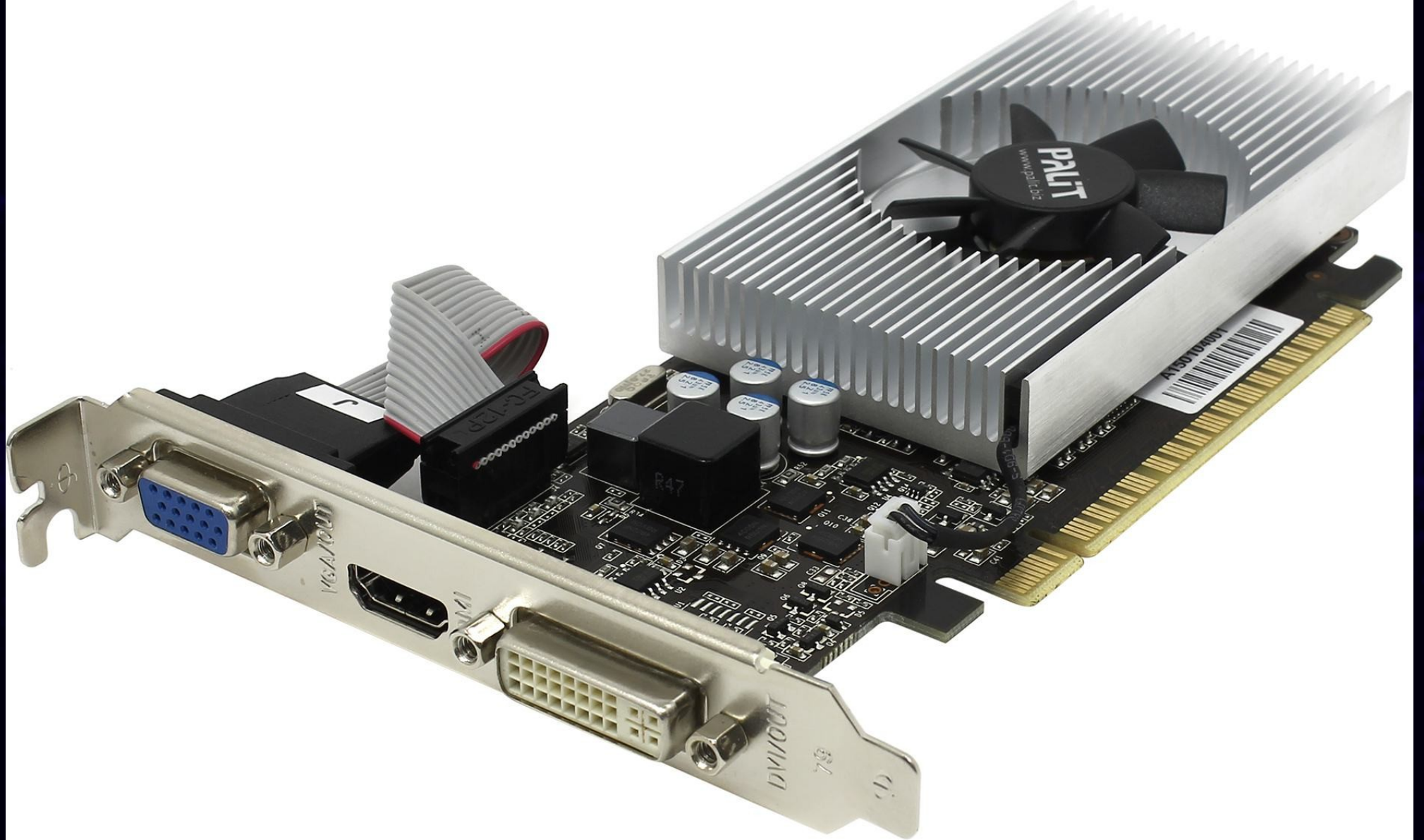




RADEON

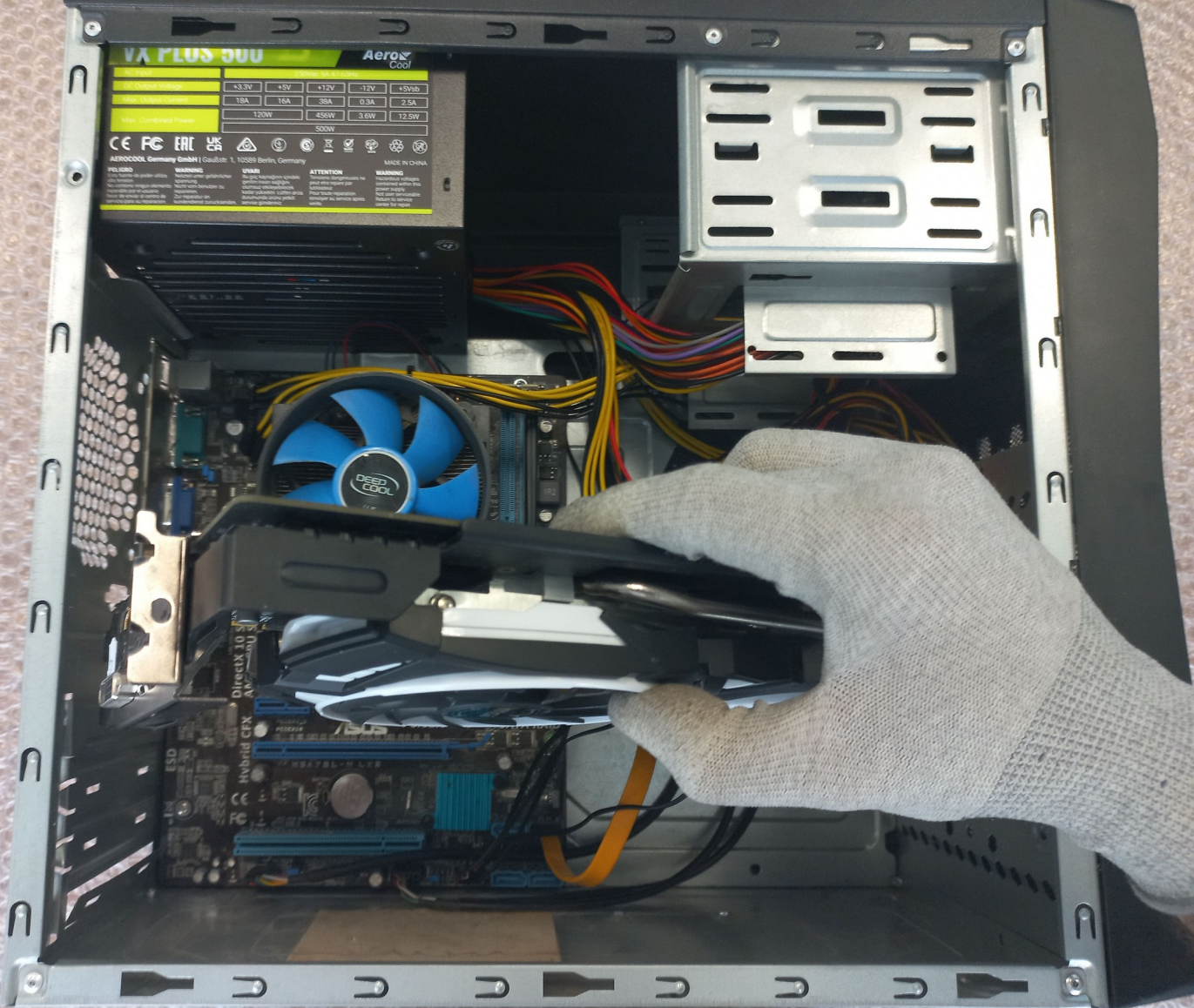
R

AMD









VA PLUS 500 AeroCool

Output Voltage	+3.3V	+5V	+12V	-12V	+5V/PS
Output Current	18A	16A	38A	0.8A	2.5A
Output Power	120W	45W	36W	12.5W	
Max. Output Power	500W				

CE FC EAC UK

AEROCOOL Germany GmbH | Gaiselstr. 1, 10589 Berlin, Germany

MADE IN CHINA

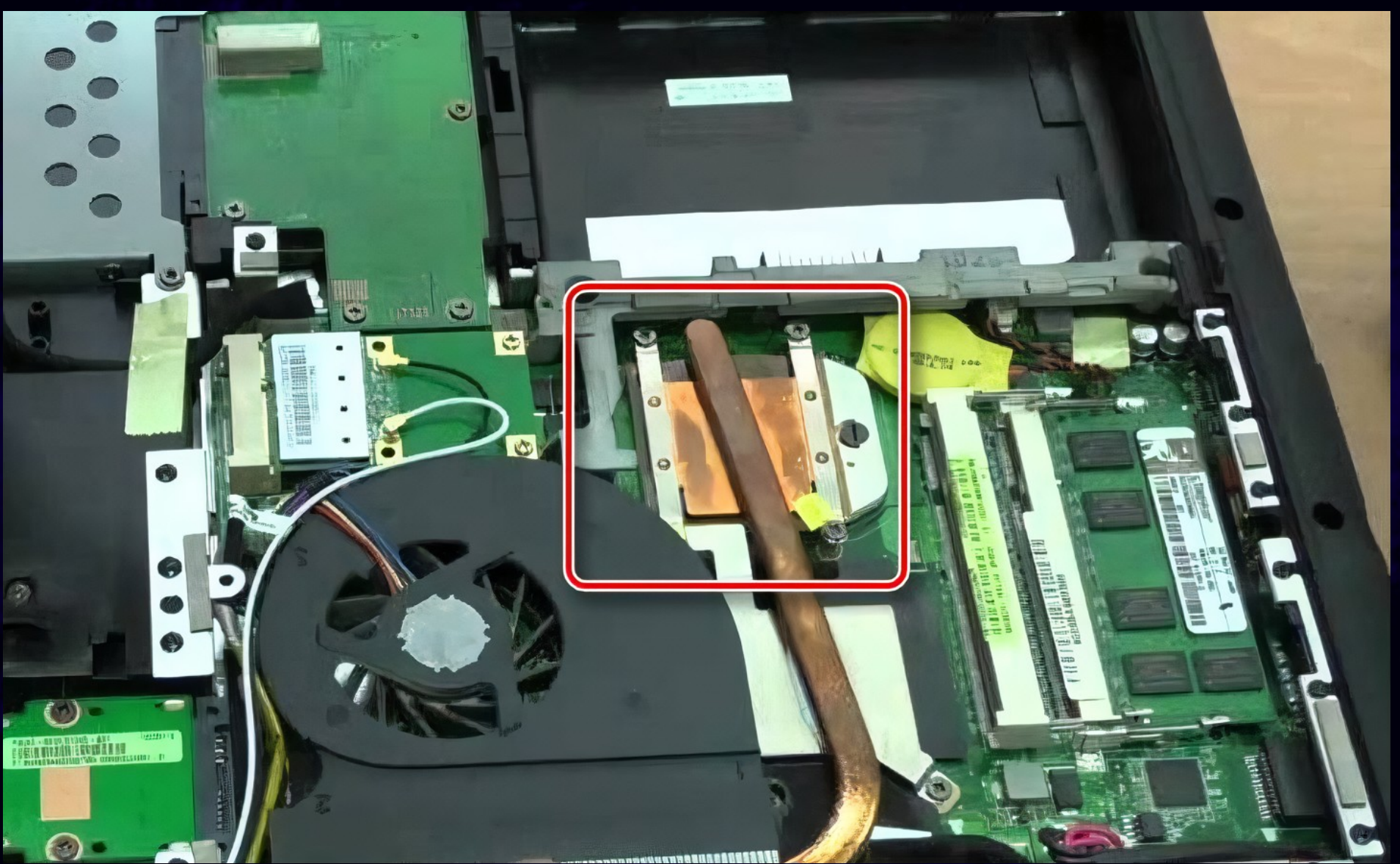
PELIGRO **WARNING** **AVVERTENZA** **ATTENTION** **WARNING**

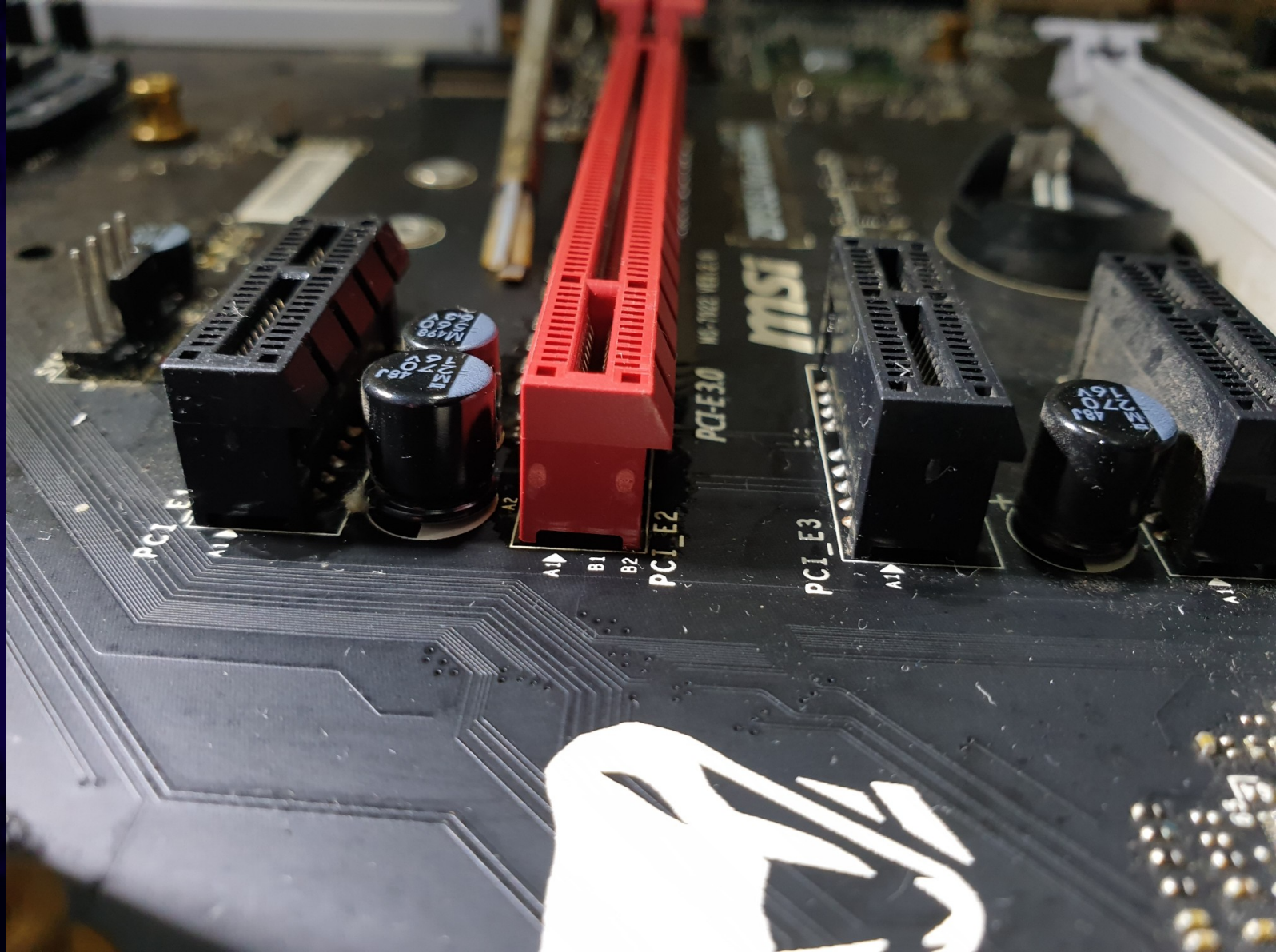
Losar el gabinete abierto, puede haber riesgo de electrocución. No toque los componentes internos del gabinete cuando el sistema esté encendido. No abra el gabinete si el sistema está encendido. No toque los componentes internos del gabinete cuando el sistema esté encendido.

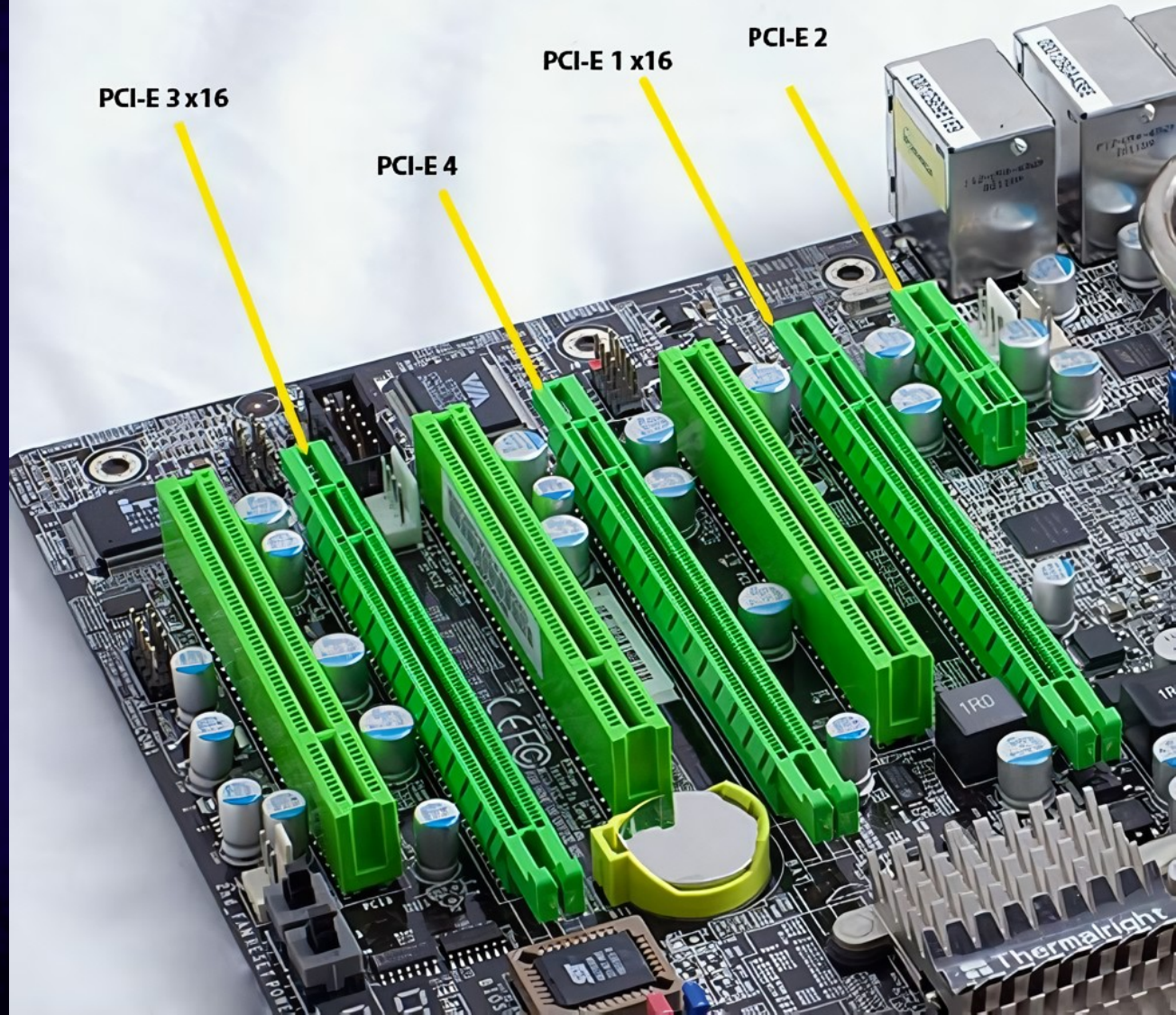
When the case is open, there is a risk of electric shock. Do not touch the internal components of the case when the system is powered on. Do not open the case if the system is powered on. Do not touch the internal components of the case when the system is powered on.

Bei geöffnetem Gehäuse besteht das Risiko eines Stromschlags. Berühren Sie nicht die internen Komponenten des Gehäuses, wenn das System eingeschaltet ist. Öffnen Sie das Gehäuse nicht, wenn das System eingeschaltet ist. Berühren Sie nicht die internen Komponenten des Gehäuses, wenn das System eingeschaltet ist.

When the case is open, there is a risk of electric shock. Do not touch the internal components of the case when the system is powered on. Do not open the case if the system is powered on. Do not touch the internal components of the case when the system is powered on.





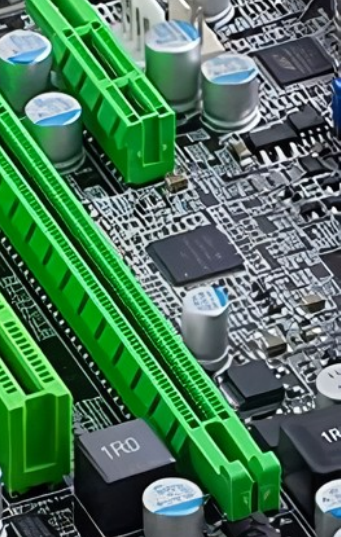


PCI-E 3 x16

PCI-E 4

PCI-E 1 x16

PCI-E 2



Материнская плата

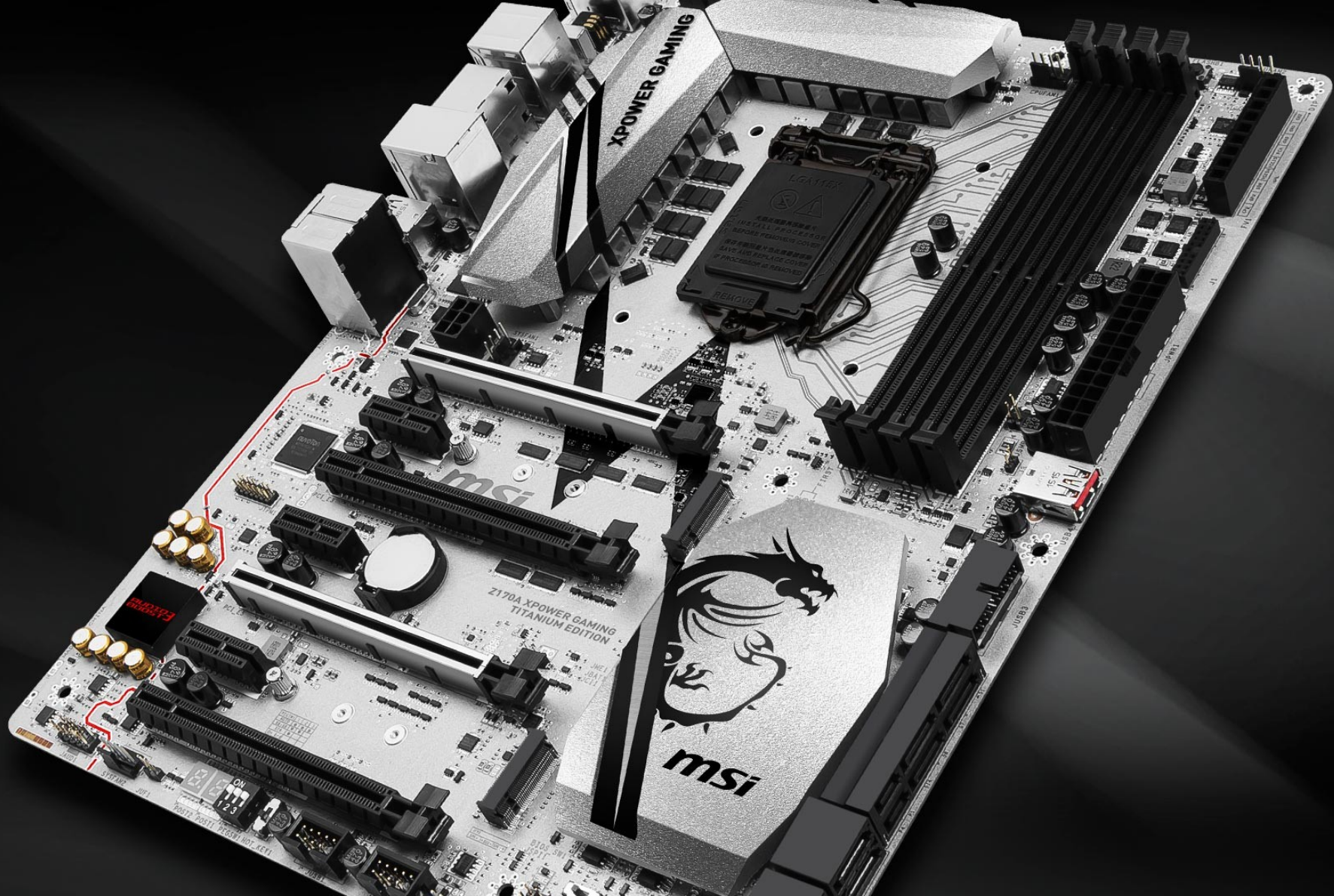
Сокет

Чипсет

Питание

Форм-
-фактор





XPOWER GAMING

msi

Z170A XPOWER GAMING
TITANIUM EDITION



EXTRAPLUS

SYSTEM

ON

1 2 3

POST CODE

POST CODE

POST CODE

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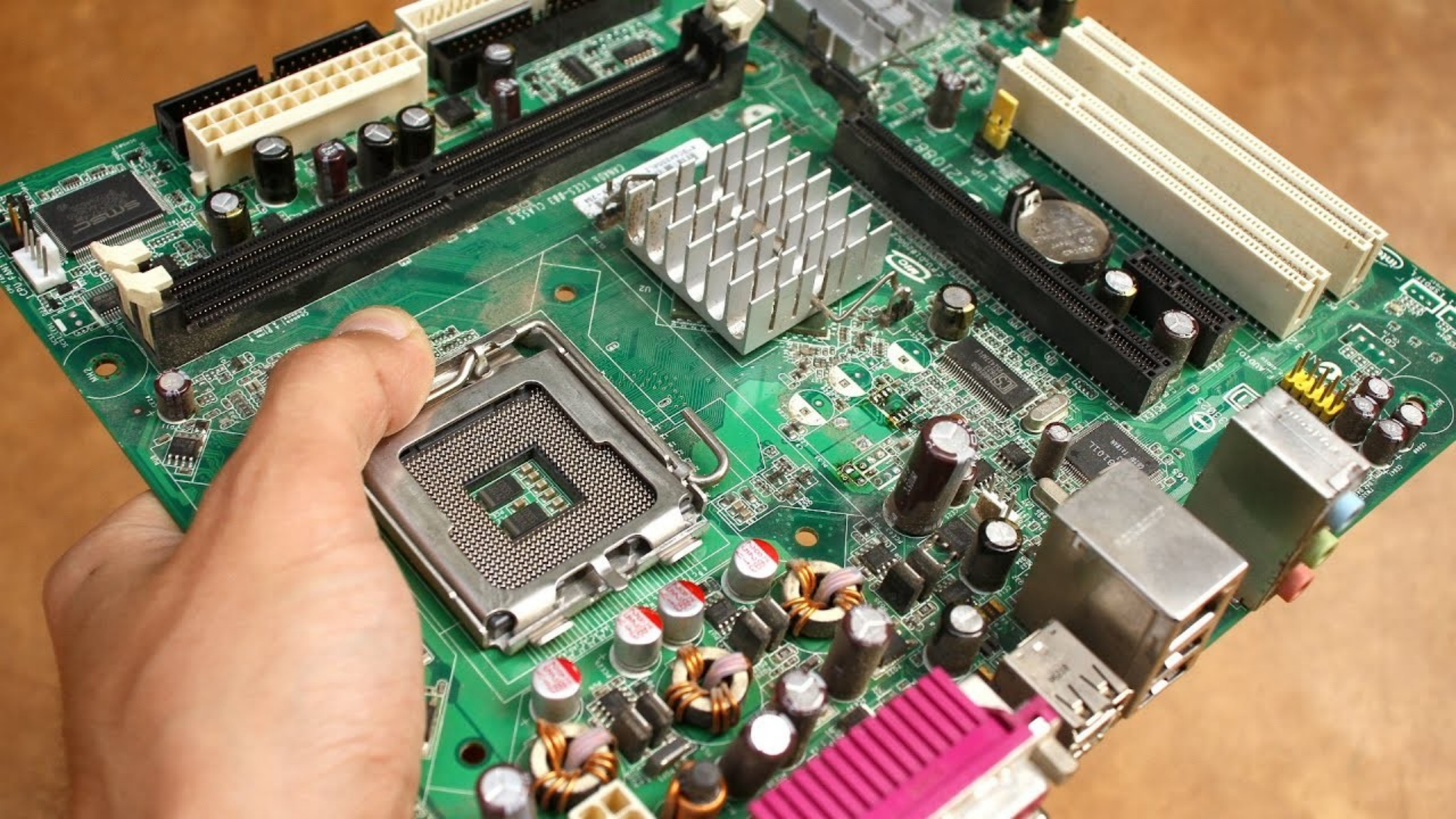
POST CODE

POST CODE

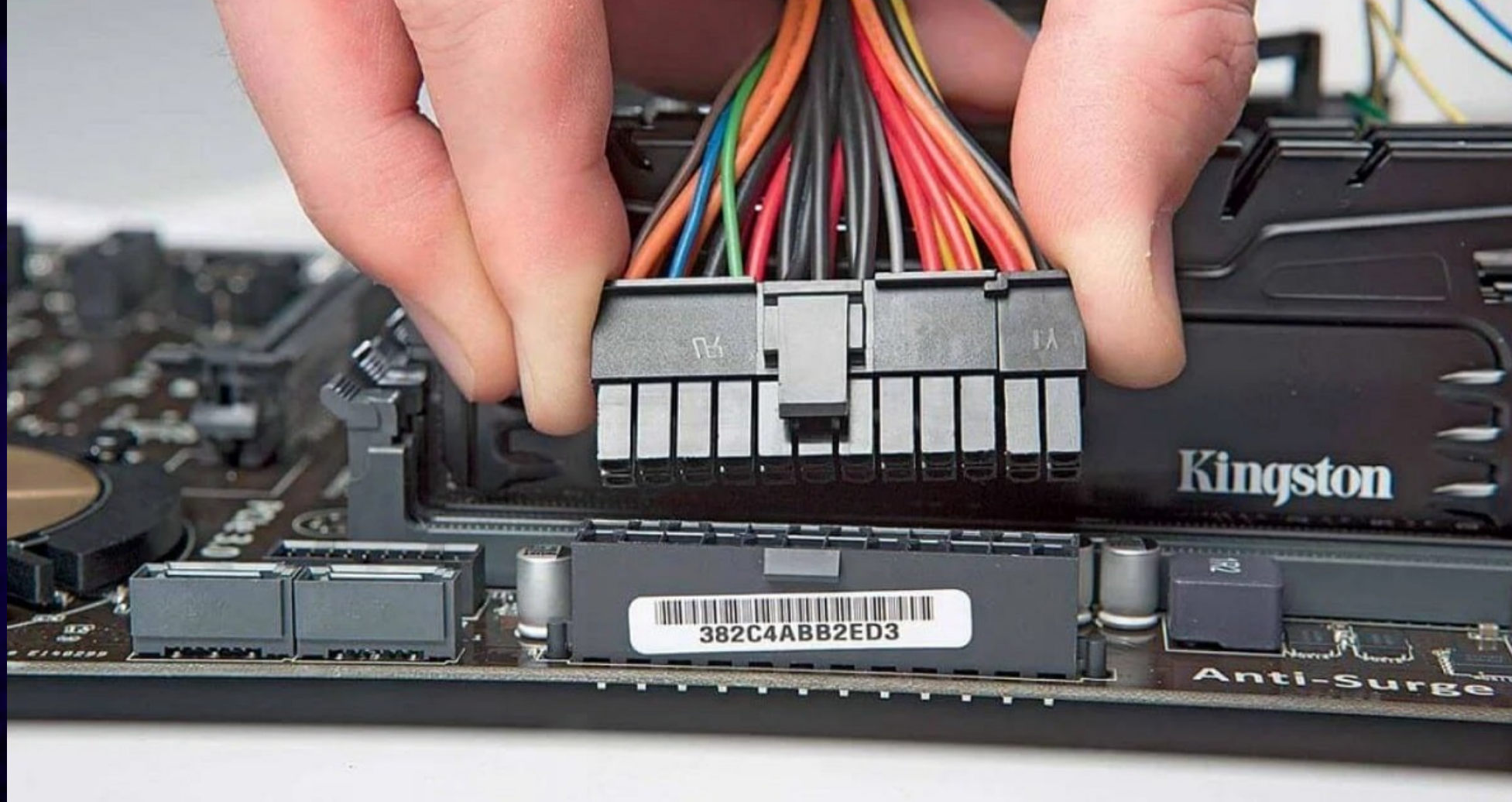
POST CODE

POST CODE

POST CODE







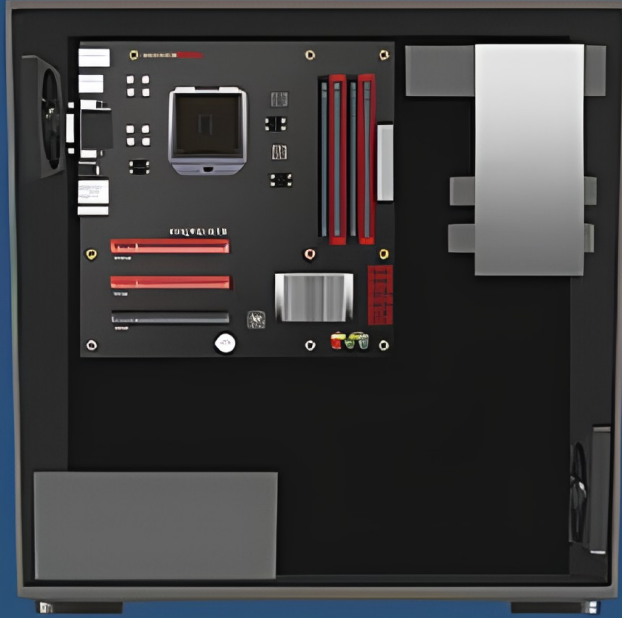
382C4ABB2ED3

Kingston

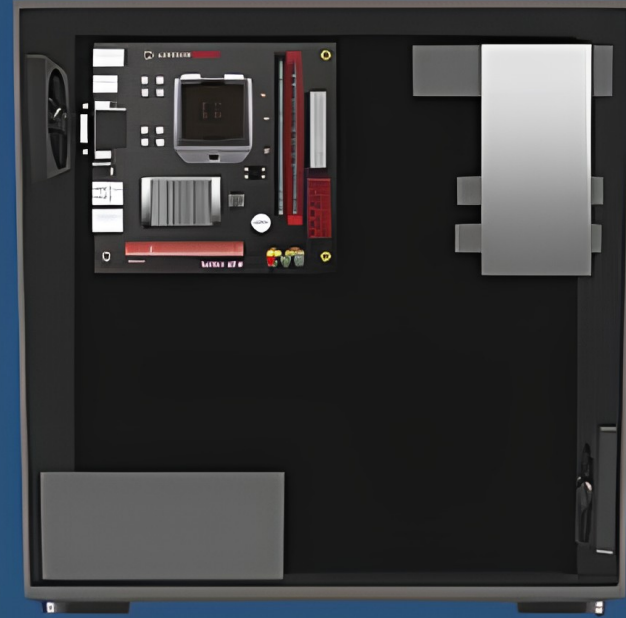
Anti-Surge



ATX

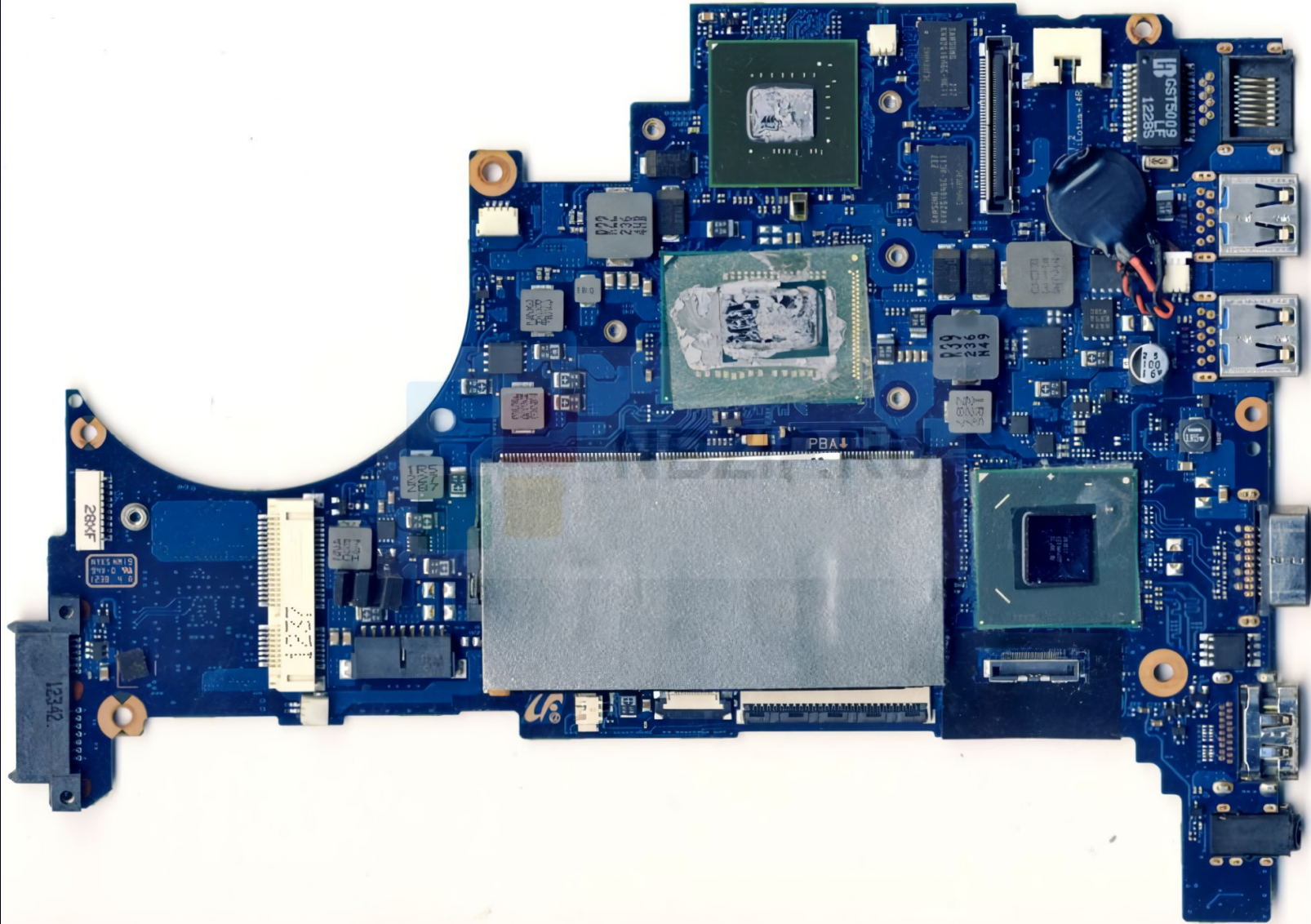


MICRO ATX

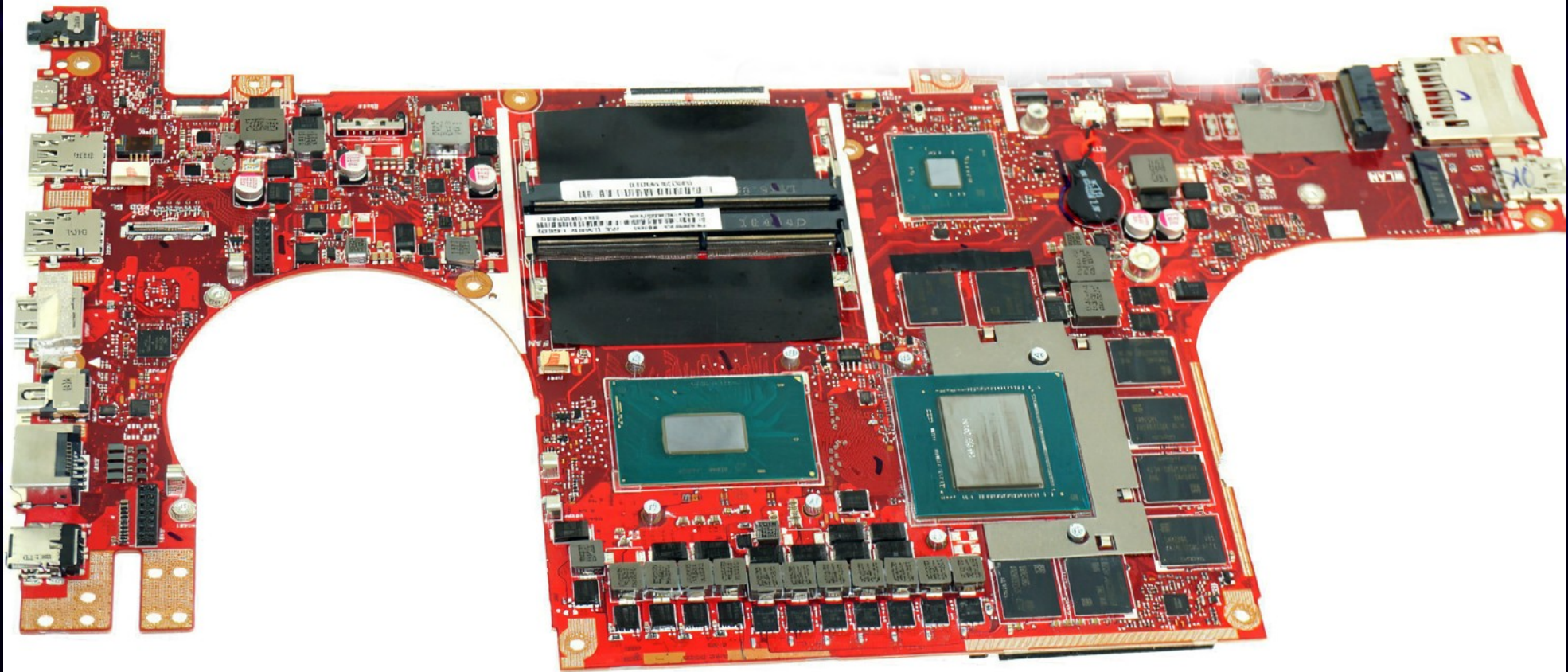


MINI ITX

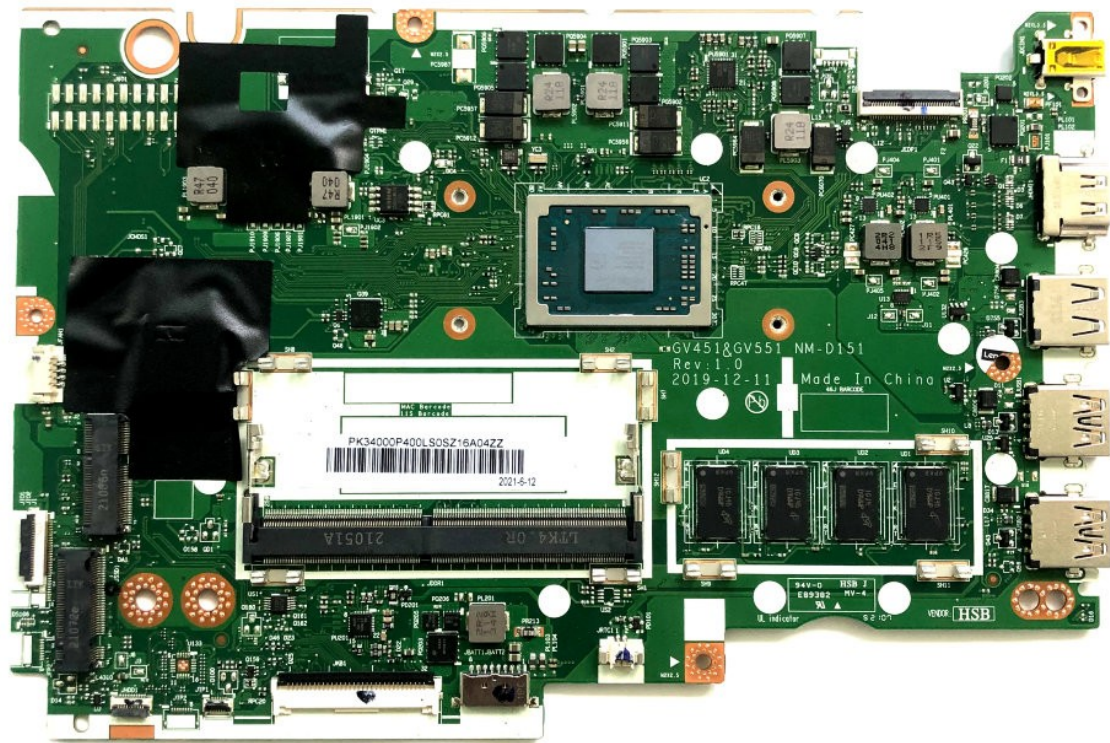


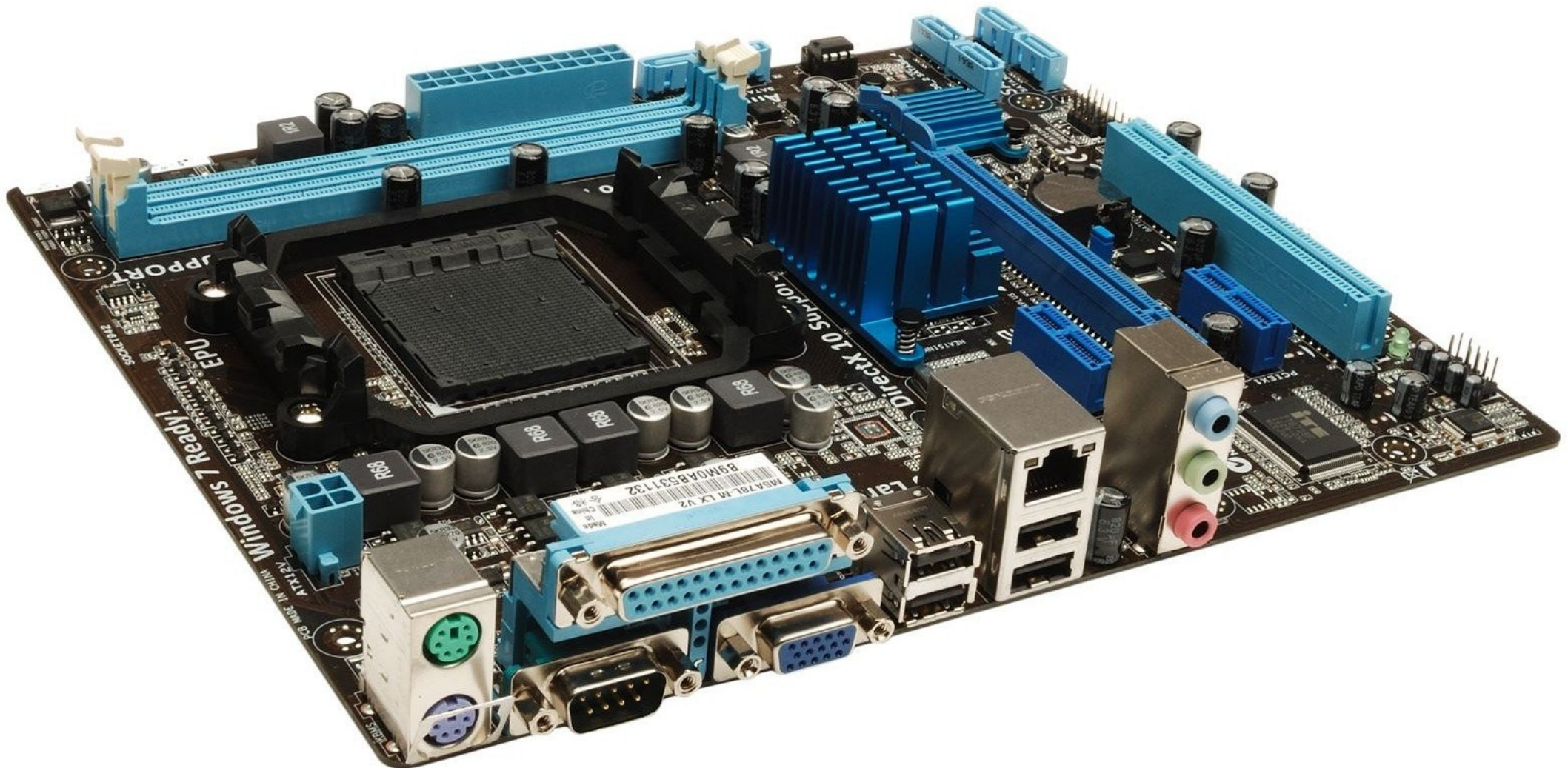


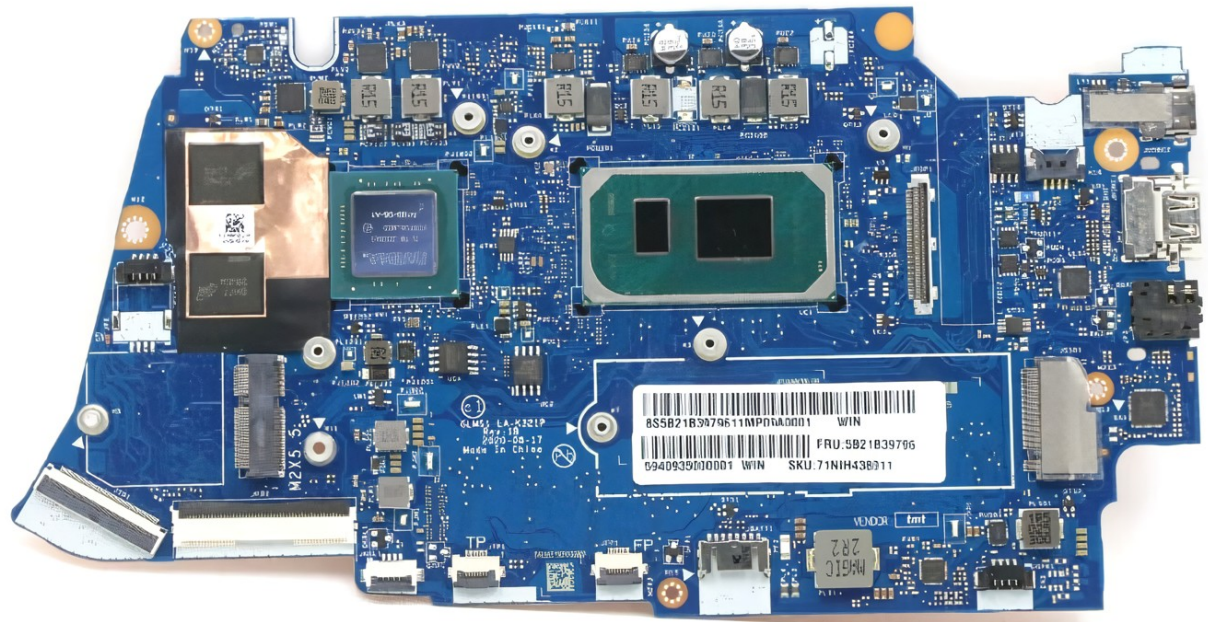












8S5B21B3070611MPD1A0001 WIN
FRU 5B21B39706
9940935010001 WIN SKU 71NH43B011

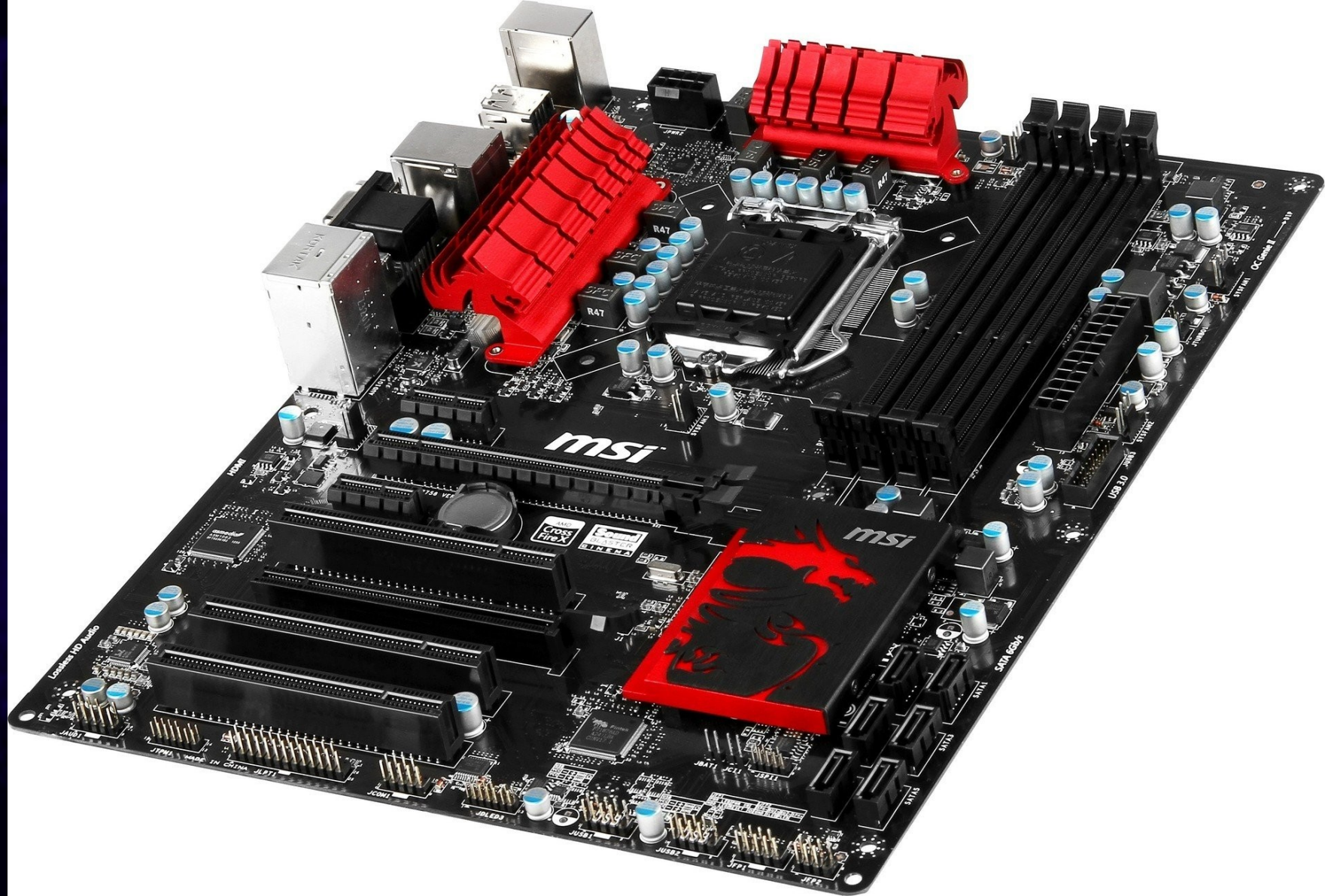
MAGIC
2R2

GLM3 LA-4321P
092-110
092-08-17
Made in China

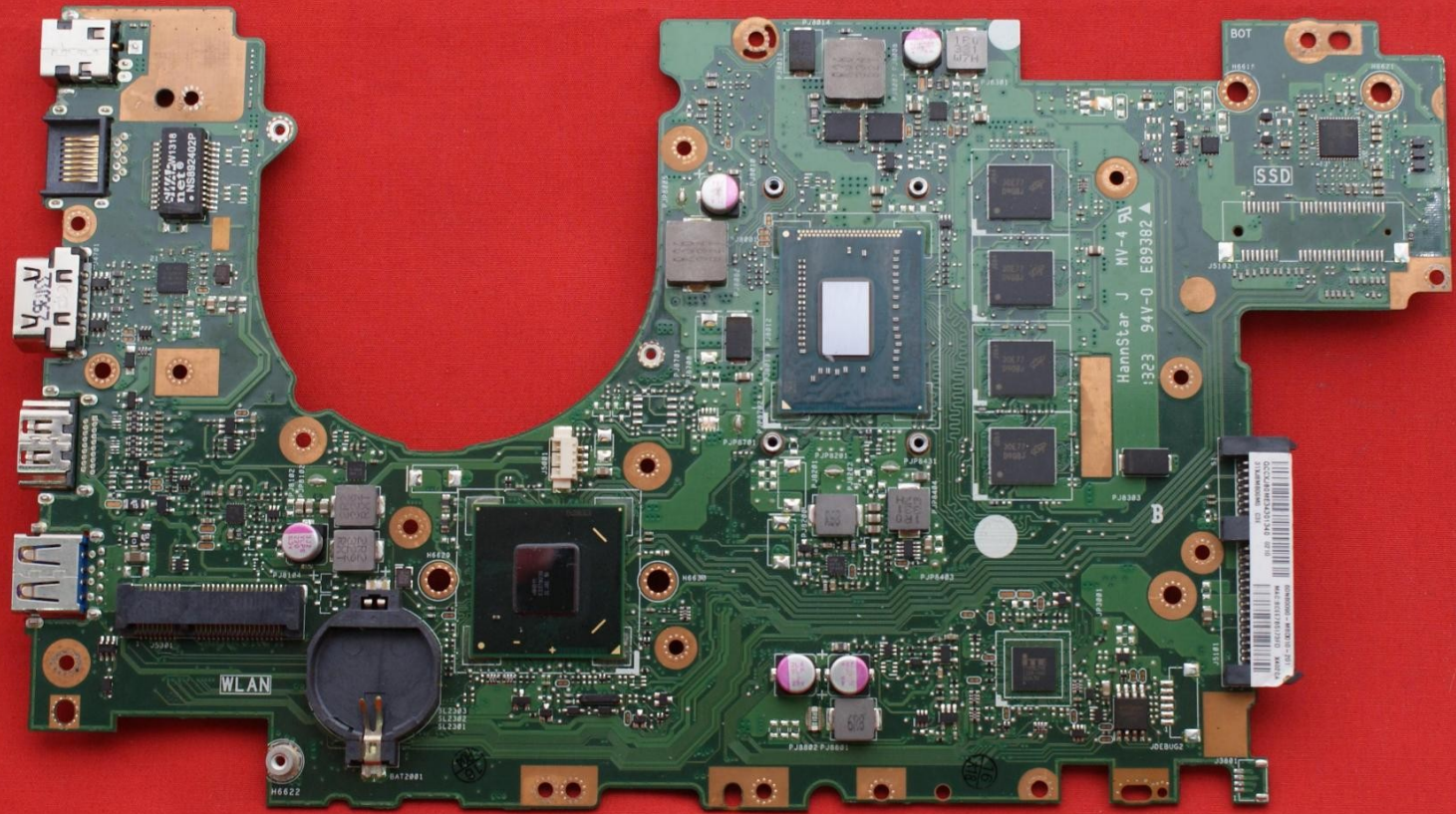
M2XS.5

MONOR tmt









USB ports
WLAN
H6622
GAT2081
1L230
1L231
1L231

SI774
W1918
NS33402P

WLAN

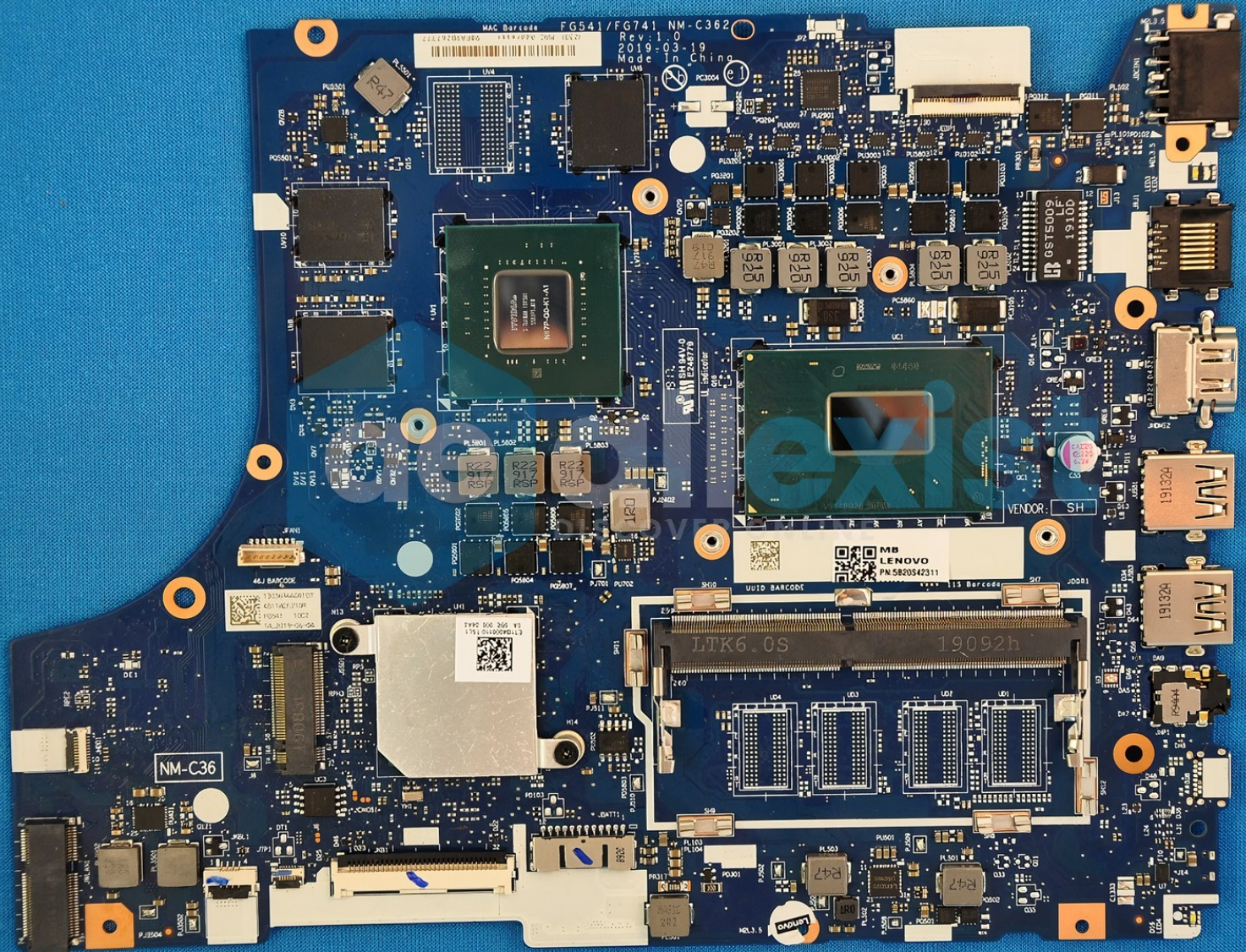
HannStar J MV-4
1323 94V-0 E89382

SSD

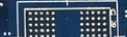
BOT

Barcode
127096 12623823127274
100 10000000000000





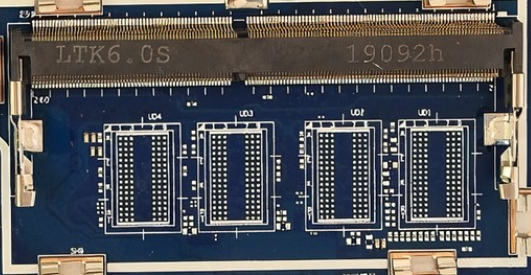
MAC Basecode FG541/FG741 NM-C362
Rev. 1.0
2019-03-19
Made in China

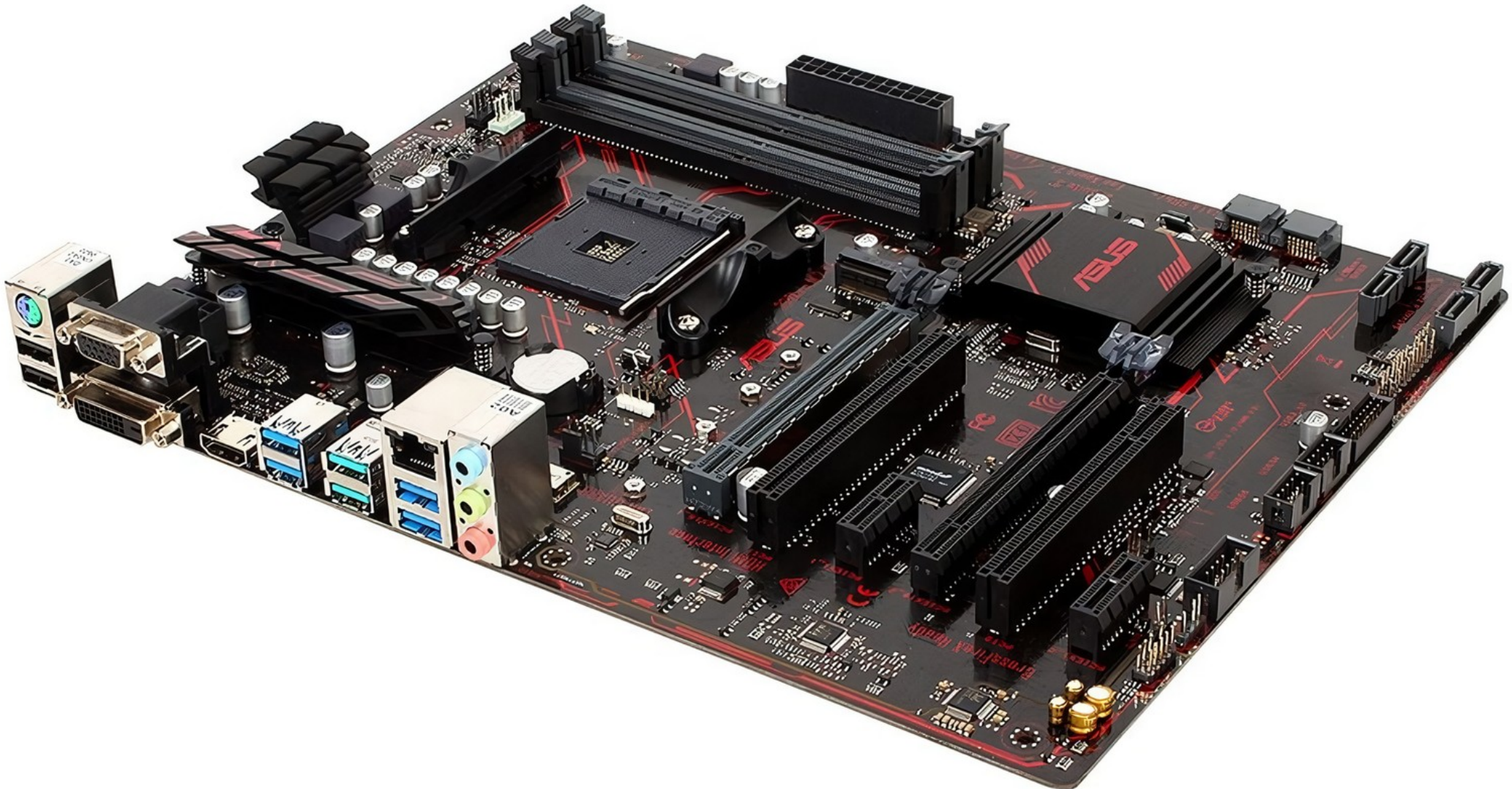


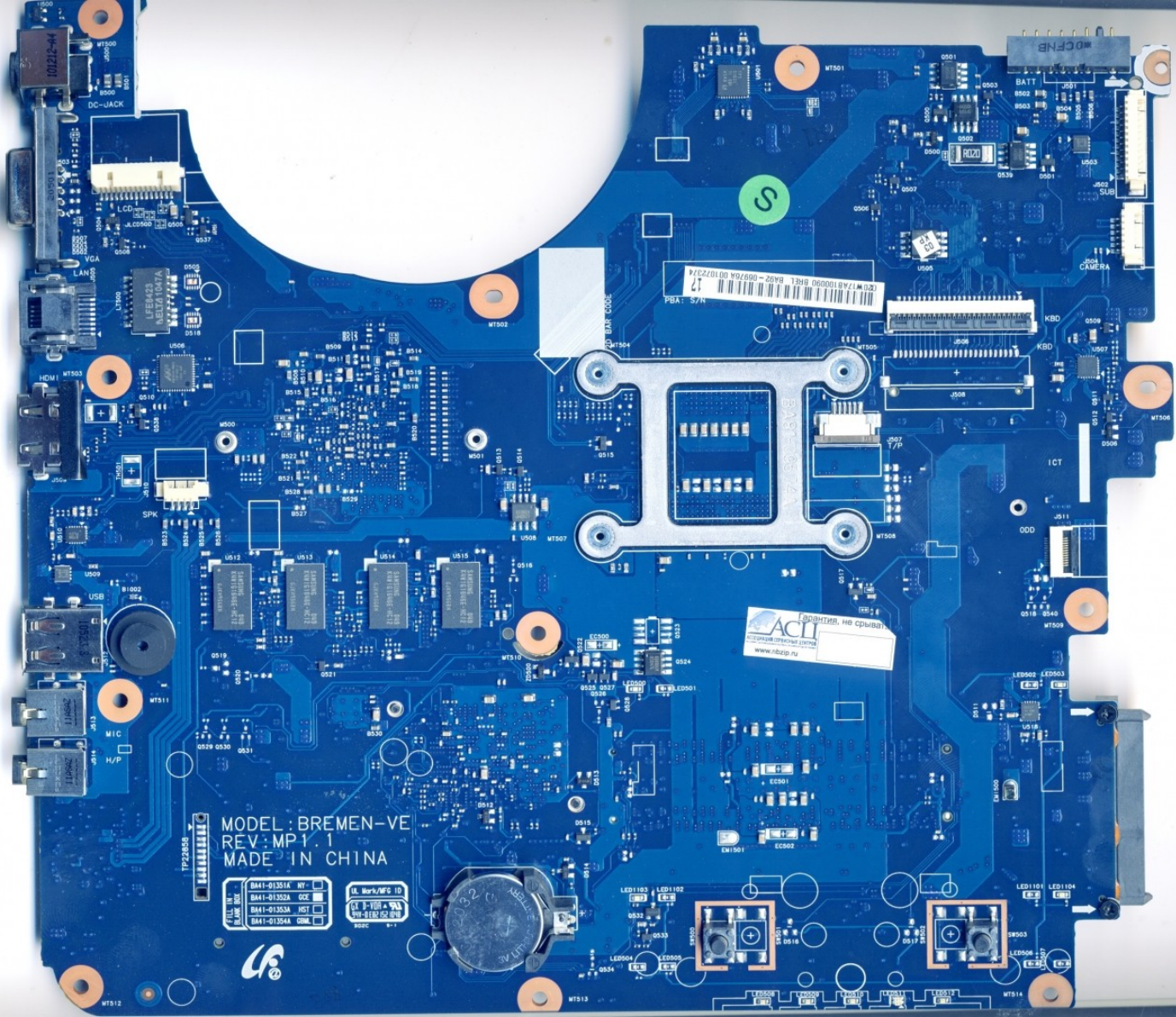
MB
LENOVO
PM 5820S42311

1320MAG101
C81AC101P
F0943 1UC2
CA 20110102

NM-C36







PCB MFG 100000 002 6429 1360 1000 001022374
PBA1 S/N

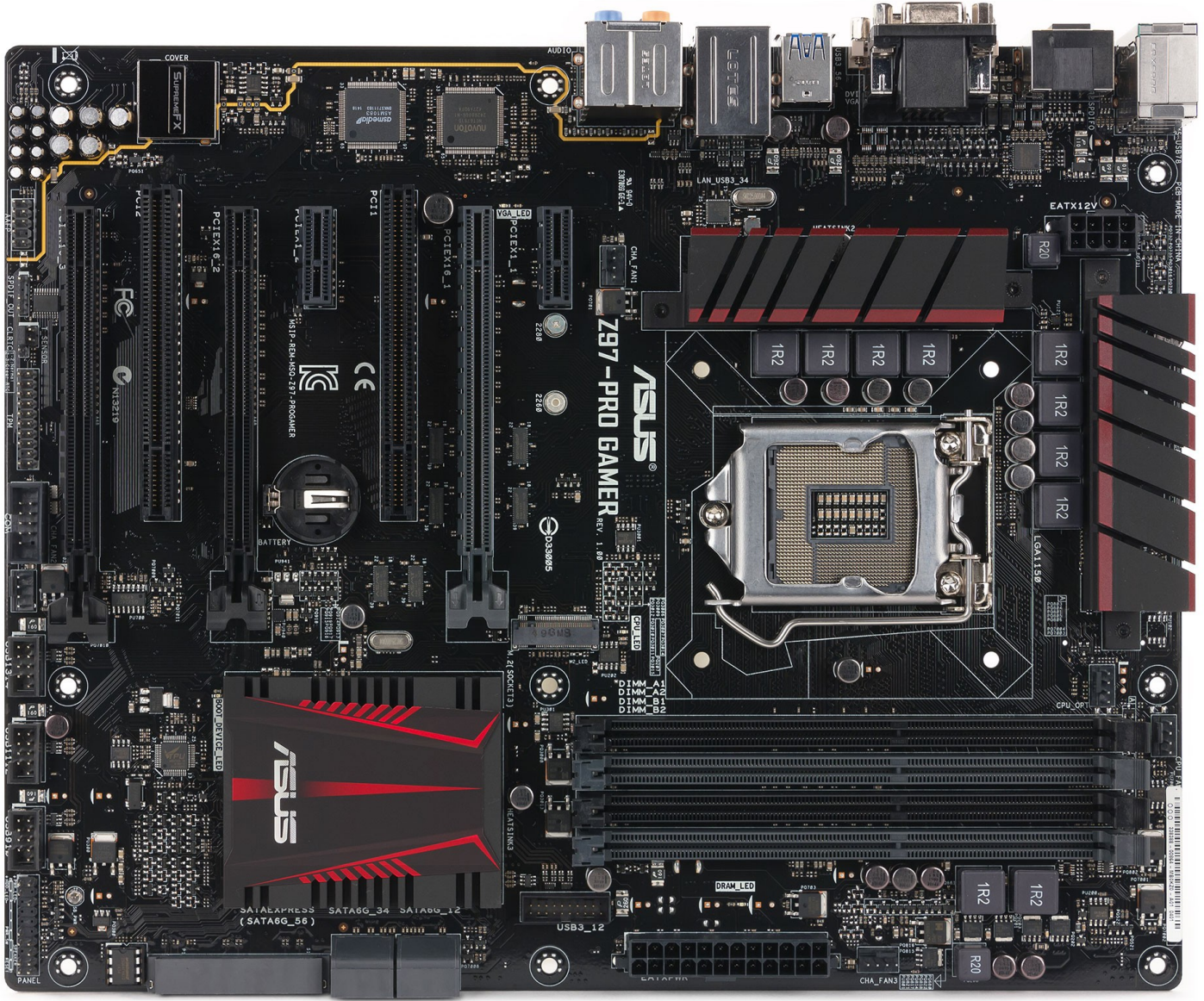
ACPI
Сервисный центр
www.abip.ru
Электроника, не срывай!

MODEL: BREMEN-VE
REV: MP1.1
MADE IN CHINA

BA1-01331A	BT
BA1-01332A	CC
BA1-01333A	DC
BA1-01334A	GM

UL Mark/MFG ID
1-100
www.ul.com





ASUS

Z97-PRO GAMER

CE

RoHS

MSMP-854-HD-371-PRODUMER

ASUS

SATA6G_56 (SATA6G_56) SATA6G_34 SATA6G_12

ASUS

Z97

PRO

GAMER

MSMP-854-HD-371-PRODUMER

Z97

PRO

GAMER

MSMP-854-HD-371-PRODUMER

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MSMP-854-HD-371-PRODUMER

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GAMER

MSMP-854-HD-371-PRODUMER





GENE

ASUS
MAXIMUS VII GENE
REV. 1.01



START

RESET

KEYBOT SOUNDSTAGE

USB13

USB1112

SATA6G_E12 SATA6G_12 SATA6G_34





Блок питания

Мощность
(в зависимости от
деталей)

Разъёмы питания
(SATA / Molex /
20 pin / 24 pin /
4 pin / PCIe)







GAMEMAX

VP-700-RGB

**RGB
READY**

AC 100-240V 50-60Hz 10-5A

AC Input

+3.3V

+5V

+12V

-12V

+5VSB

DC Output

20A

20A

48A

0.5A

2.5A

Current

120W

576W

6W

12.5W

Max. Output
Wattage

120W

576W

6W

12.5W

**80
PLUS**

CE FC

UA TR 911

EAC

CB

RoHS

Recycling symbol

Recycling symbol

Recycling symbol

Recycling symbol

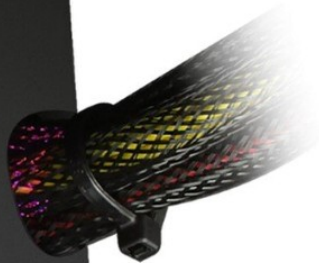
APFC

MADE IN CHINA

CAUTION!

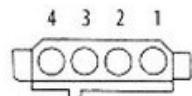
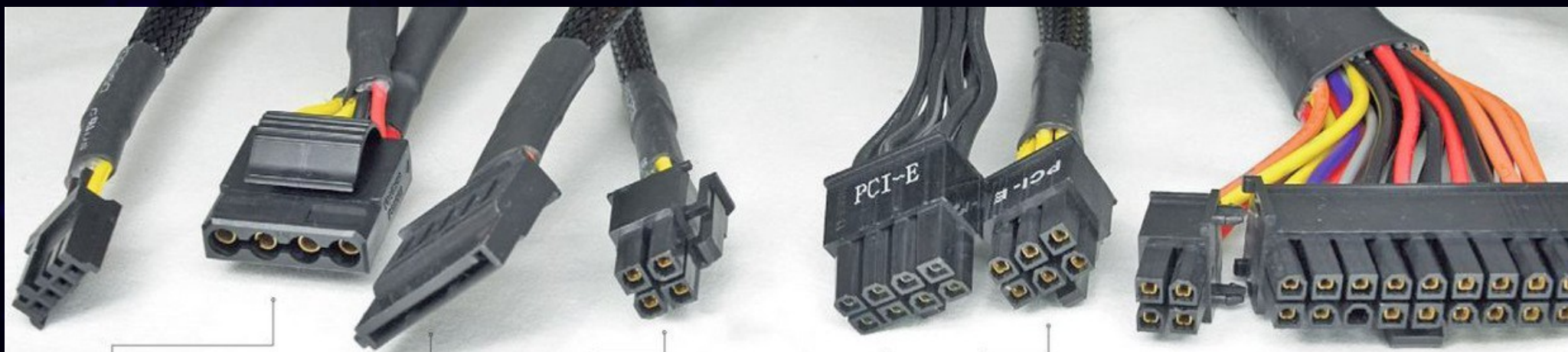
DO NOT REMOVE THIS COVER.
TRAINED SERVICE PEOPLE ONLY.

Serial number

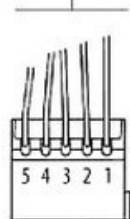




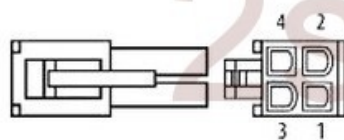




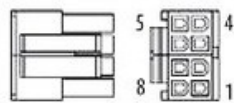
molex-коннектор		
Цвет	Сигнал	Контакт
Красный	+5 VDC	1
Черный	COM	2
Черный	COM	3
Желтый	+12 VDC	4



SATA-коннектор		
Цвет	Сигнал	Контакт
Желтый	+12 VDC	1
Черный	COM	2
Красный	+5 VDC	3
Черный	COM	4
Оранжевый	+3.3VDC	5



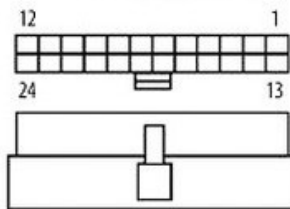
Коннектор линии +12 В (4-контактный)		
Цвет	Сигнал	Контакт
Черный	COM	1
Черный	COM	2
Желтый	+12 V1DC	3
Желтый	+12 V1DC	4



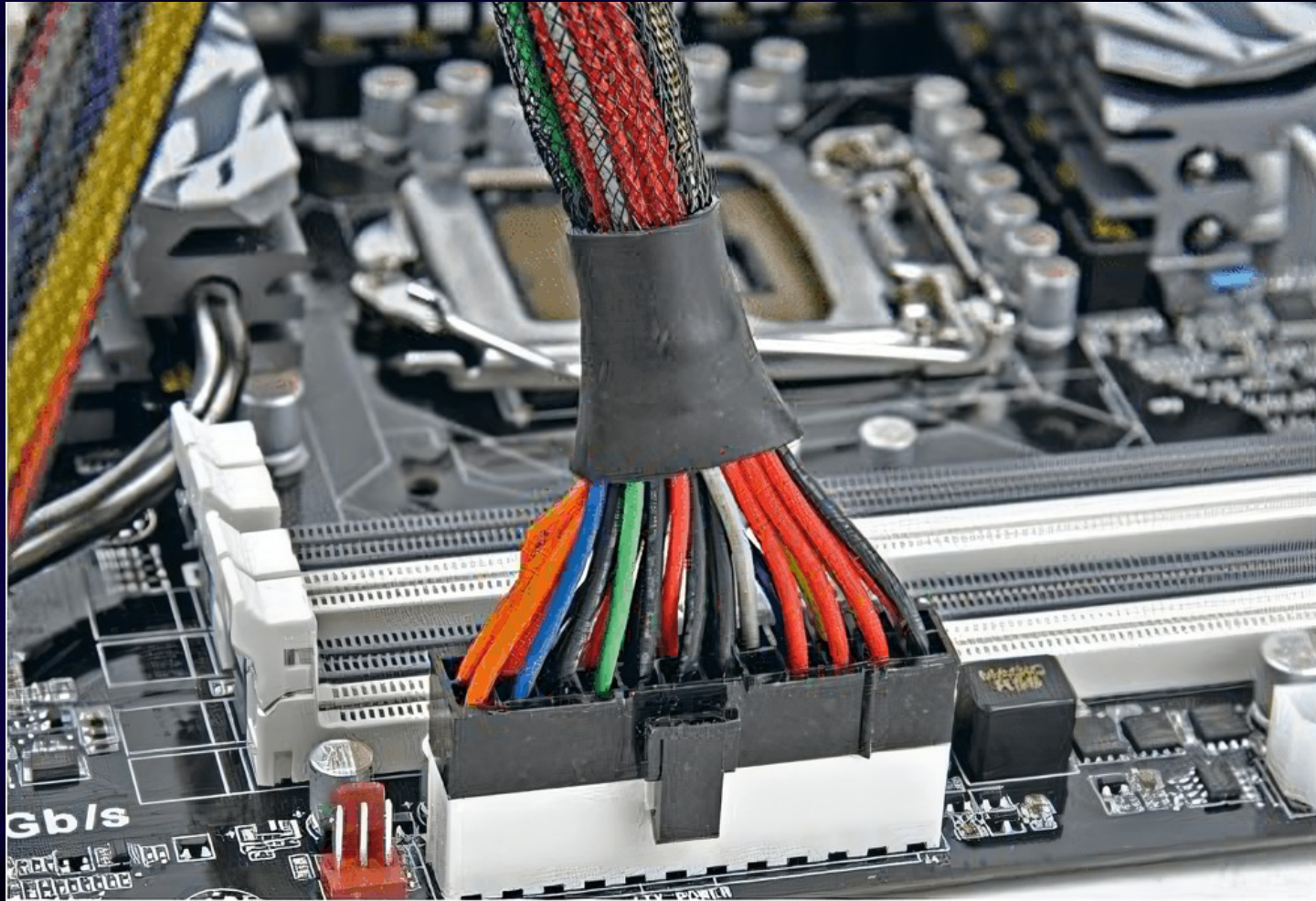
Коннектор линии +12 В (8-контактный)		
Цвет	Сигнал	Контакт
Черный	COM	1
Черный	COM	2
Черный	COM	3
Черный	COM	4
Желтый	+12 VDC	5
Желтый	+12 VDC	6
Желтый	+12 VDC	7
Желтый	+12 VDC	8

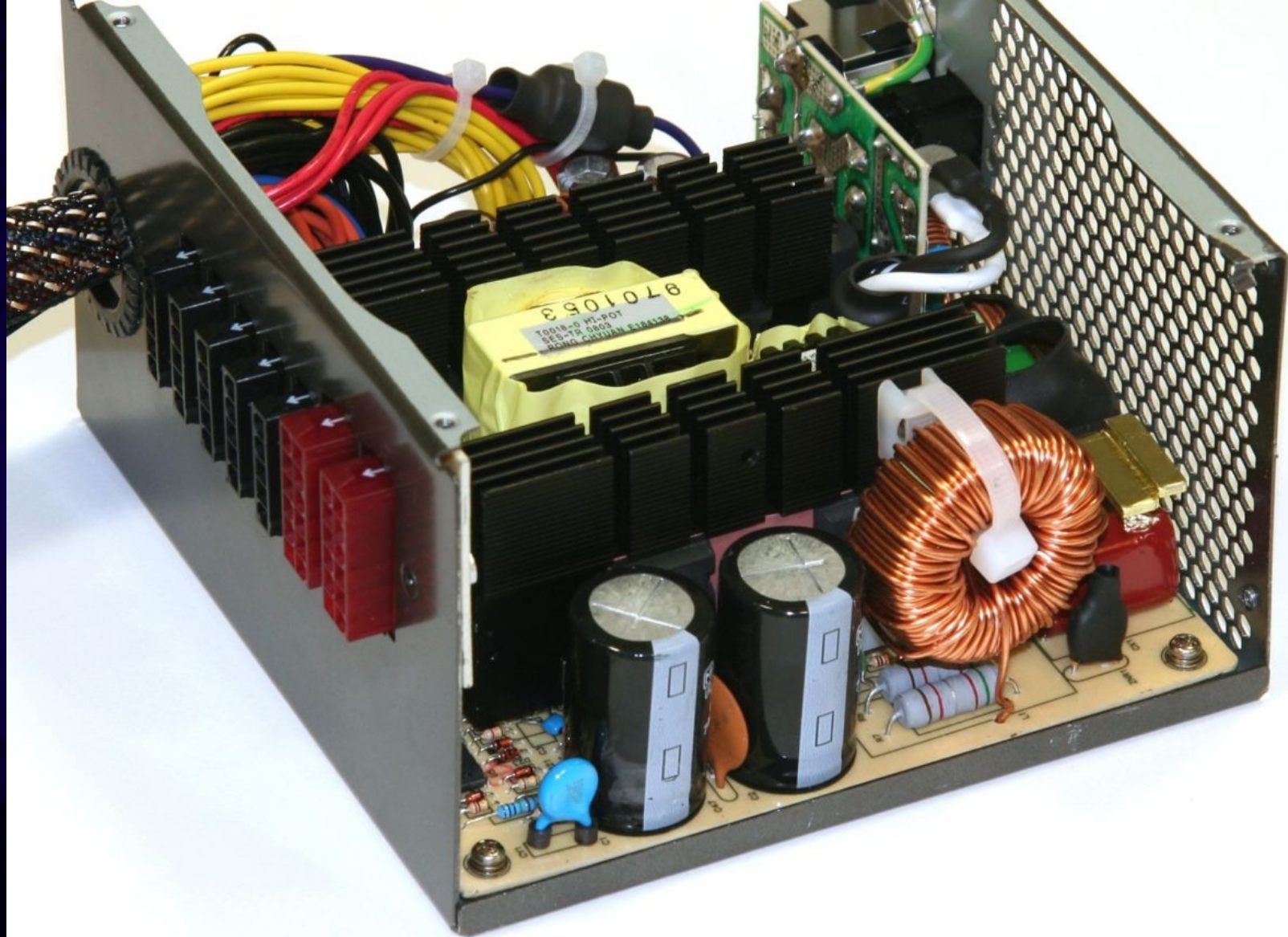


Разъем дополнительного питания видеокарт		
Цвет	Сигнал	Контакт
Желтый	+12 V2DC	1
Желтый	+12 V2DC	2
Желтый	+12 V2DC	3
Черный	COM	4
Черный	COM	5
Черный	COM	6



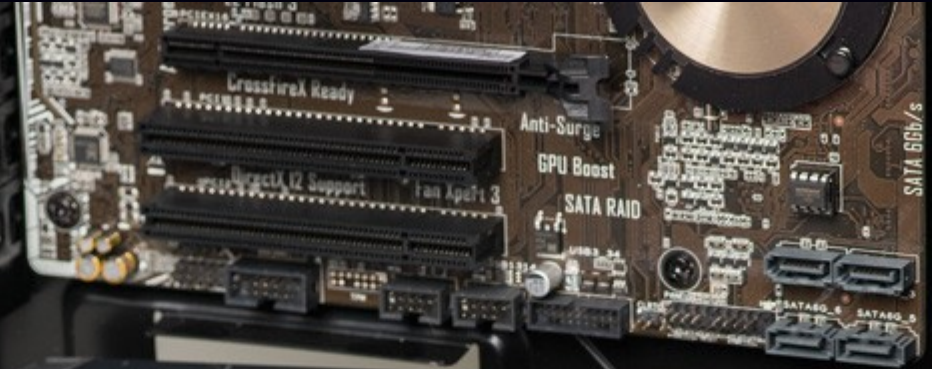
24-контактный разъем					
Сигнал	Цвет	Контакт	Контакт	Цвет	Назначение
+3.3 V	Оранжевый	1	13	Оранжевый	+
+3.3 V	Оранжевый	2	14	Синий	-
COM	Черный	3	15	Черный	
+5 V	Красный	4	16	Зеленый	P
COM	Черный	5	17	Черный	
+5 V	Красный	6	18	Черный	
COM	Черный	7	19	Черный	
PWR_ON	Серый	8	20		не
+5 Vsb	Фиолетовый	9	21	Красный	
+12 V3	Желтый	10	22	Красный	
+12 V3	Желтый	11	23	Красный	
+3.3 V	Оранжевый	12	24	Черный	





be quiet!

DARK POWER PRO
650 WATT







Монитор

Матрица
IPS

Разрешение
(1920x1080 FullHD и
выше)

Частота

Диагональ дисплея
(от 23" до 27")

Яркость /
Контрастность



















Корпус

Mini-ITX



Micro-tower

Micro-ATX

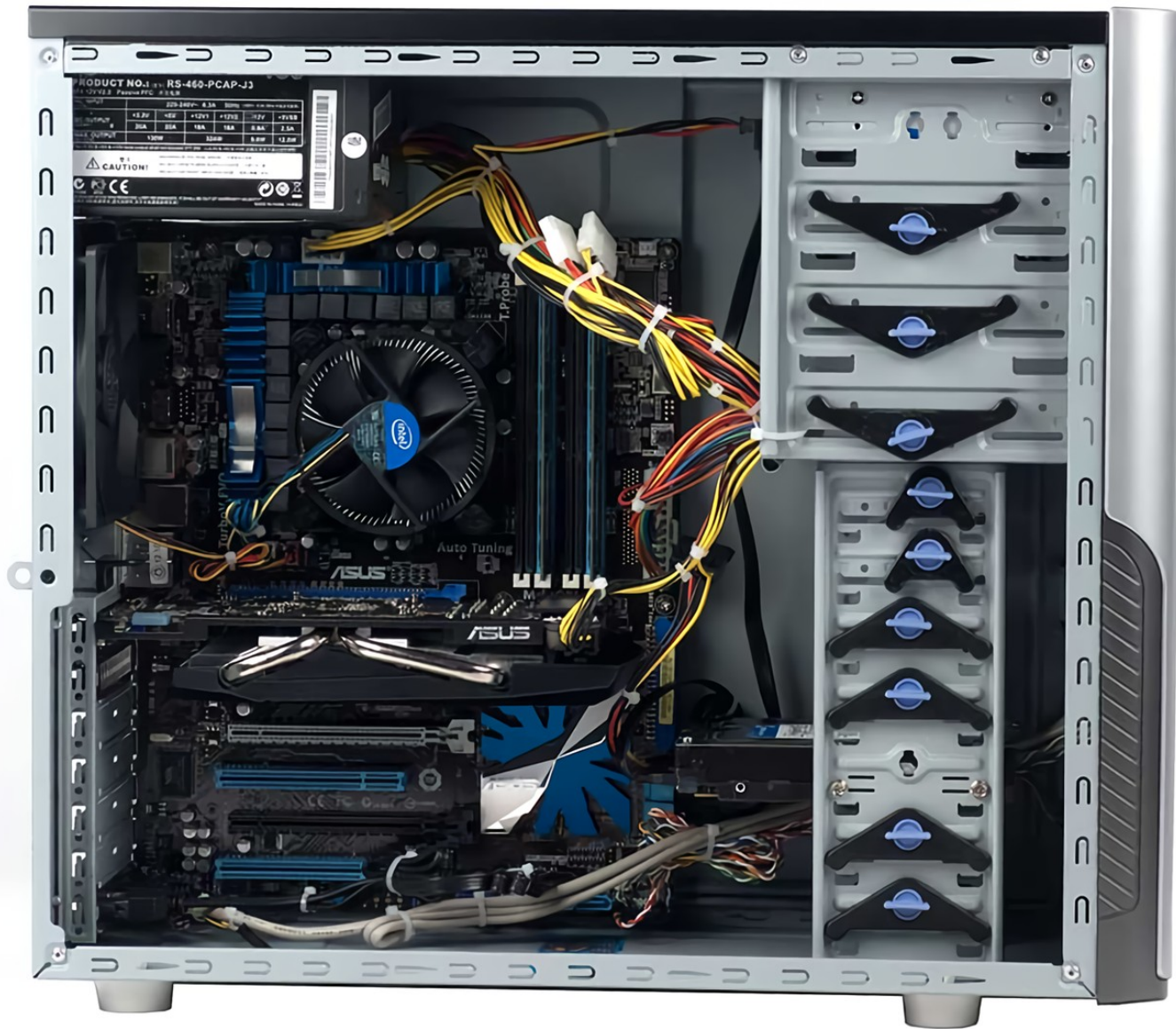


Mini-tower

ATX



Midi-tower







AX760

Front panel I/O including a power button, two USB 3.0 ports, and audio jacks.





























SINGWELL		MODEL: SW-450W	
AC INPUT	115V/230VAC	8A/4A	50/60Hz
AC OUTPUT	115V/230VAC	1A/0.5A	50/60Hz
DC OUTPUT	+3.3V	+5V	+12V1
	+12V2	-12V	+5VSB
	1.8A	2.5A	2.2A
	2.1A	0.5A	2.5A
1.85W		9.6W	12.5W
450W			
CAUTION: HAZARDOUS AREA			
WARRANTY INFORMATION			
SERIAL NO. 0398			
MADE IN CHINA			



128GB
SATA III
SSD



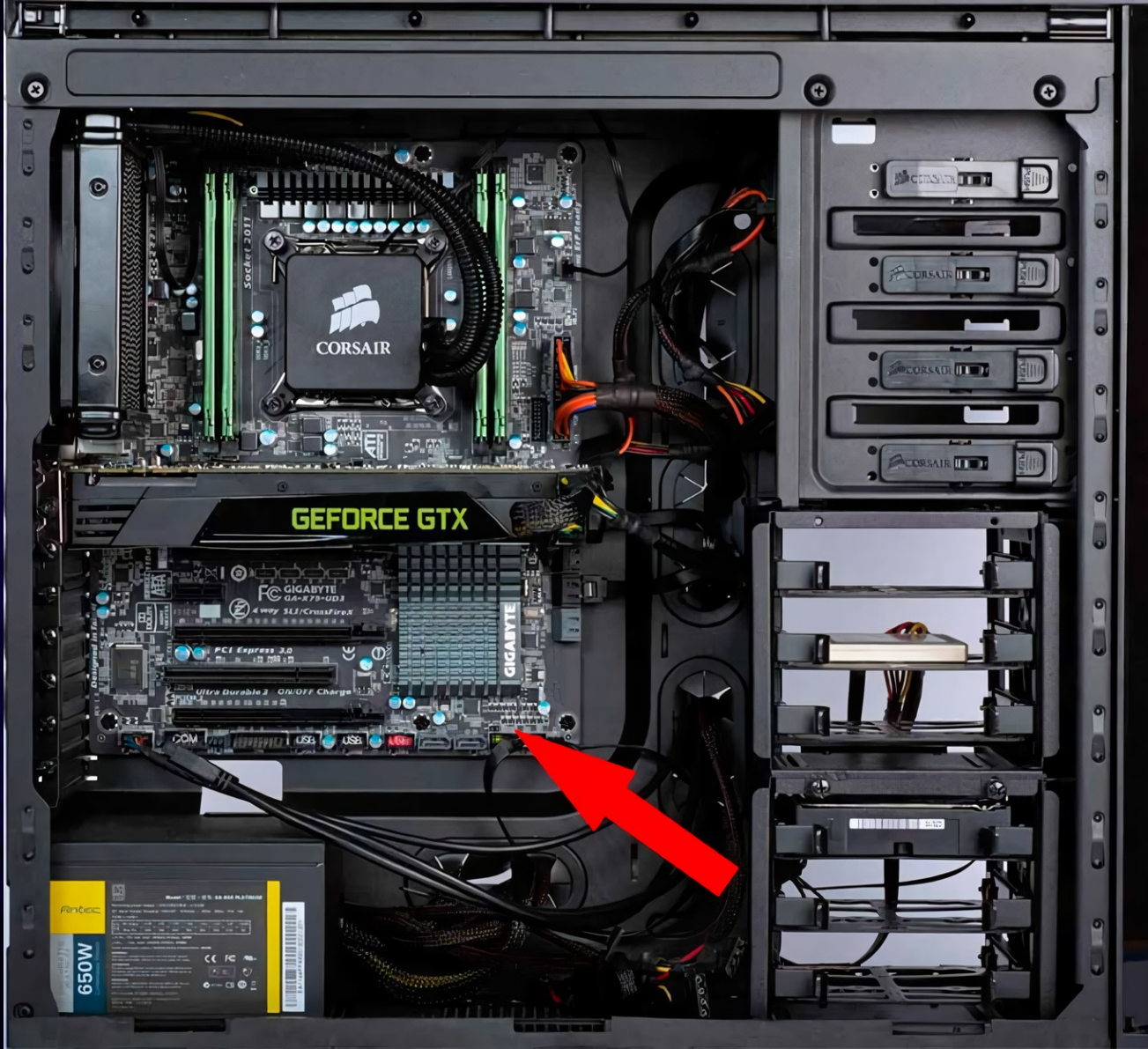














Thermaltake TR2 500W

Output Voltage (V)	Output Current (A)	Output Power (W)
+3.3V	30.0	99.0
+5.0V	20.0	100.0
+12V	41.7	500.4
-12V	0.5	6.0
Efficiency (%)		82.0
Power Factor (PF)		0.99
Hold-up Time (ms)		20.0
Power Good (ms)		10.0
Power On (ms)		10.0
Power Off (ms)		10.0
Power Standby (W)		0.5
Power Sleep (W)		0.5
Power Idle (W)		0.5
Power Full Load (W)		500.0
Power Max (W)		550.0

Model: TR2-500W12V1
Part No: TR2-500W12V1
Power: 500W
Voltage: 12V
Current: 41.7A
Efficiency: 82%
Power Factor: 0.99
Hold-up Time: 20ms
Power Good: 10ms
Power On: 10ms
Power Off: 10ms
Power Standby: 0.5W
Power Sleep: 0.5W
Power Idle: 0.5W
Power Full Load: 500W
Power Max: 550W







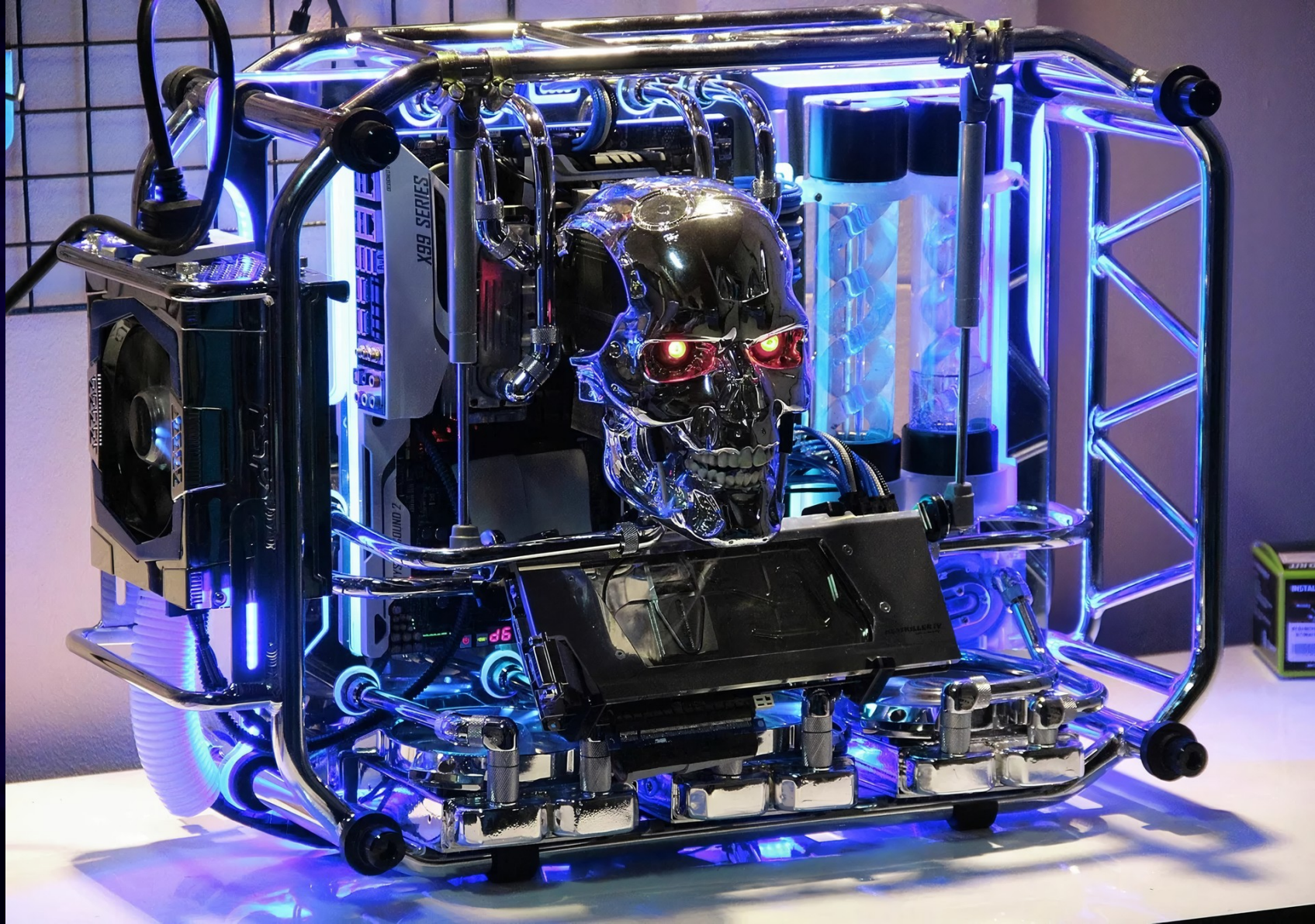
HYPERPC











Компьютерная мышь



Размер

Форма

Интерфейс

Тип датчика

Разрешение













Выходная
мощность

Мощность

Форма
выходного
напряжения



ИБП
(источник бесперебойного
питания)



NETYS PE

socomec
Innovative Power Solutions











ВХОД

ВЫХОД



APC
www.apc.com

Back-UPS ES
700

Surge Protection Only

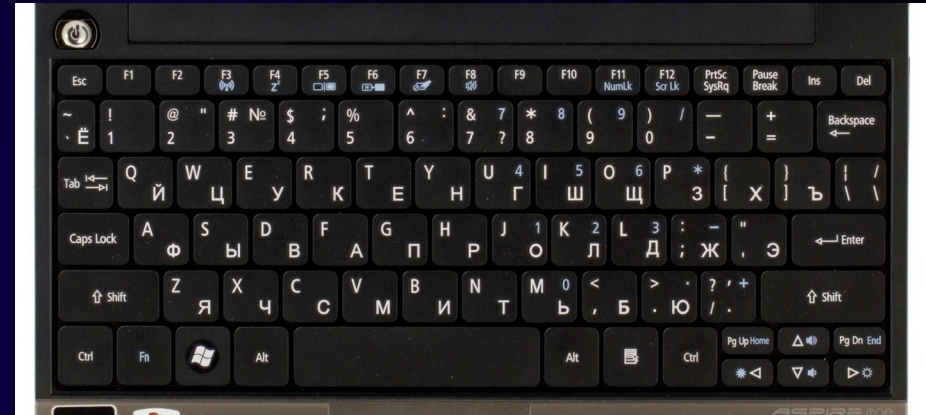
Battery Backup & Surge Protection

Power On
Protects Battery

Периферия

















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Благодарю за внимание