



Sony PlayStation 5

Computer Science

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Outline

- **Introduction**
- **Specification**
- **Technology Analysis**
- **Industrial Analysis**
- **SWOT**
- **Conclusion**
- **Reference**



Playstation 5(PS5) - Introduction

- **Release Date: 2020/11/12**
- **Product Type: Home video game console**
- **Developer: Sony Interactive Entertainment**
- **Edition**
 - PS5: includes an optical disc drive
 - PS5 Digital: digital download games

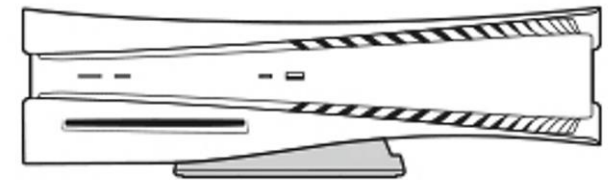
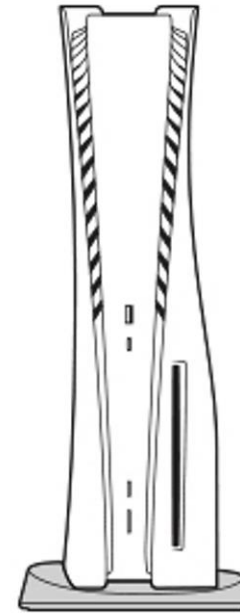


PS5 Console

- PS5 base: Vertically/ Horizontally lay down

- Features

- Backwards compatibility
- GPU
 - 4K resolution, 120Fps
 - Raytracing acceleration
 - Tempest Engine for 3D audio effect
- SSD: high-speed data streaming



PS5 Controller – DualSense

■ Haptic feedback

- vibration for environment
- ex: explosion, footsteps

■ Adaptive triggers in L2, R2 buttons

- Force feedback: feel what character holds in game
- Changing resistance of the trigger

■ Speaker





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PS5 - Specification

Component	Specification	Remarks
CPU	x86-64-AMD Ryzen Zen 2	8 cores/16 threads, frequency up to 3.5GHz
GPU	AMD Radeon RDNA 2	Ray Tracing acceleration 36 compute units, frequency up to 2.23GHz/ theoretical performance to 10 TFLOPS
Memory	GDDR6 SDRAM 16GB	maximum bandwidth 448GB/s
Internal Storage	Custom 825GB SSD	IO throughput 5.5GB/s
Optical Drive	Ultra HD Blu-ray	
Power	PS5: 350W PS5 Digital Edition: 340W	
Dimensions	PS5: 390mm x 104mm x 260mm PS5 Digital Edition: 390 x 92 x 260	
Weight	PS5: 4.5kg PS5 Digital Edition: 3.9kg	

Techonolgy Analysis

- Fan: both sides
- Storage Expansion: M.2 interface with PCIe4.0 support
- Ultra HD Blue-ray drive
 - Two layers of insulators: reduce noise & vibration



Image source: <https://youtu.be/weOCONceK4E>

Motherboard

- CPU: x86-64-AMD Ryzen Zen 2
- GPU:AMD Radeon RDNA 2
- Memory: 8 GDDR6 16GB
- Onboard SSD: 825GB
- Custom SSD Controller

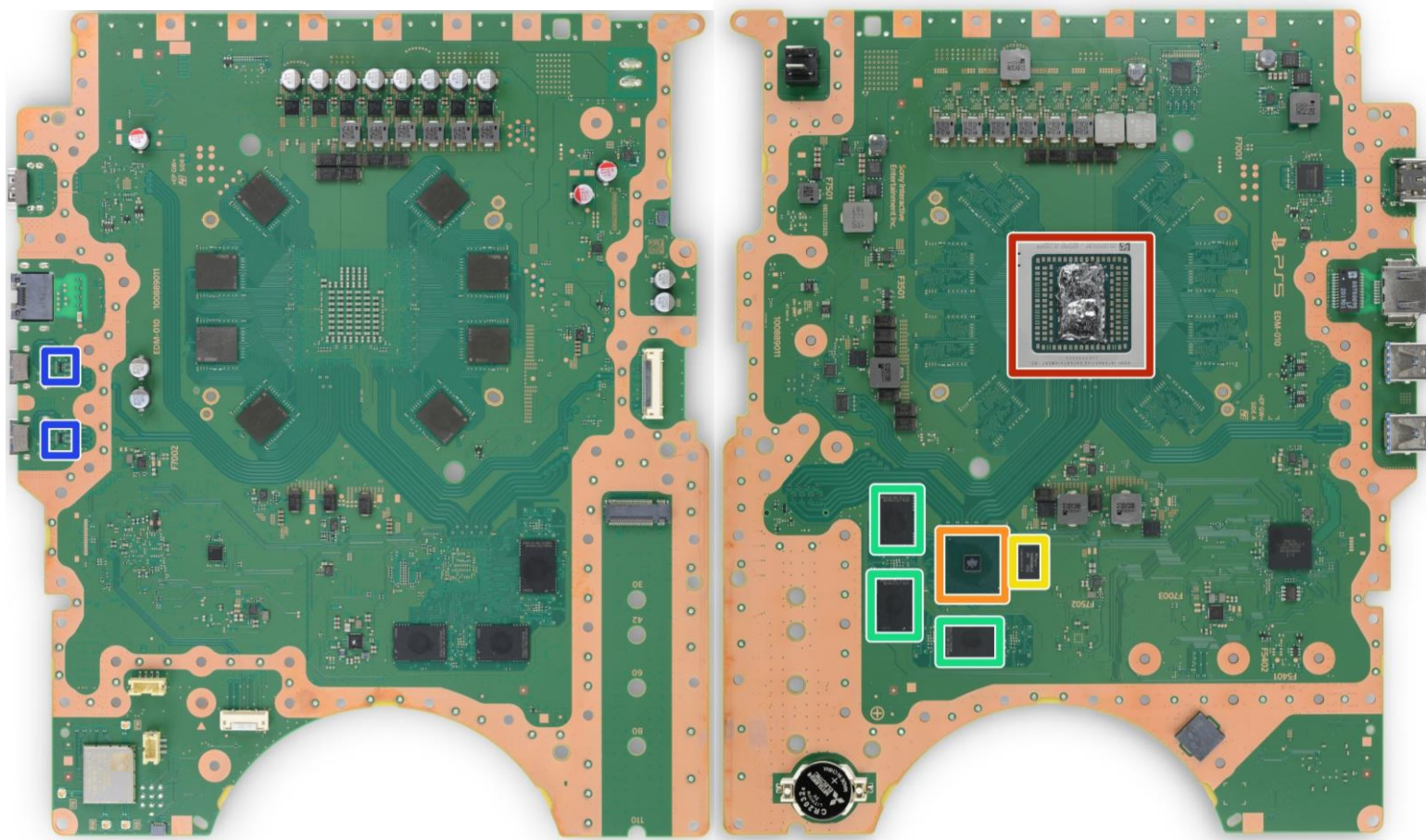


Image source: <https://zh.ifixit.com/Guide/PlayStation+5+%E6%8B%86%E8%A7%A3/158280>

Others

- Heatsink: heat pipe
- Power supply unit: 350W





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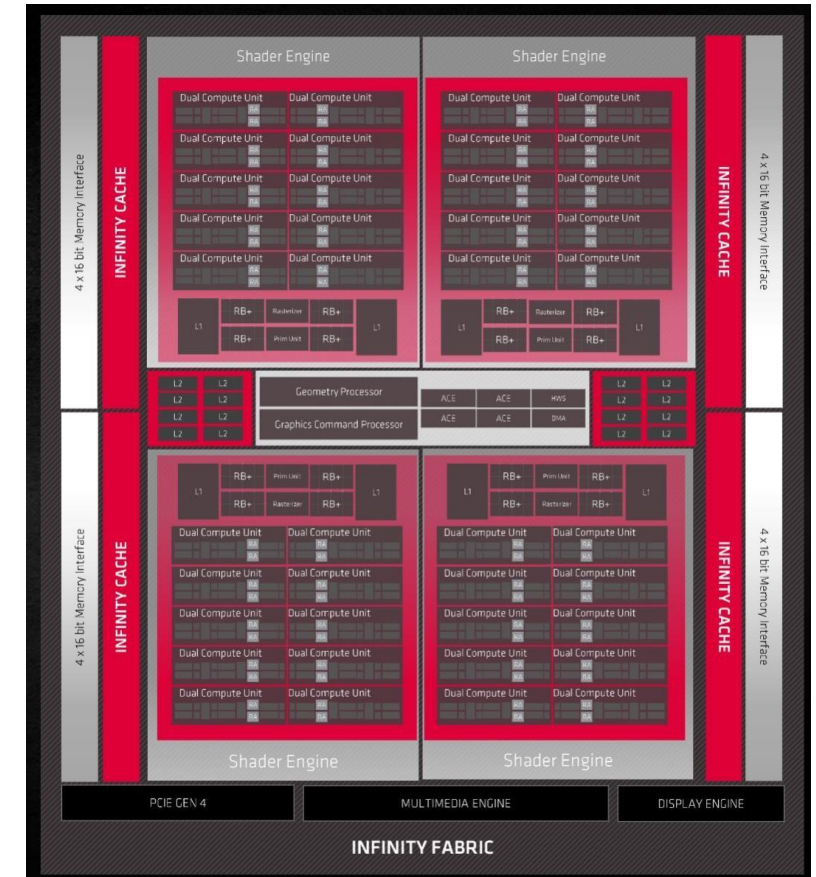
CPU: AMD Zen 2

- computer processor microarchitecture
- Larger branch-target buffers (BTB)
- CCX
 - 16MB L3 Cache(Game cache) + 4 cores
- TSMC 7nm MOSFET
 - increases IPC
 - bigger transistor floorplan whilst decreasing the silicon area by almost half.



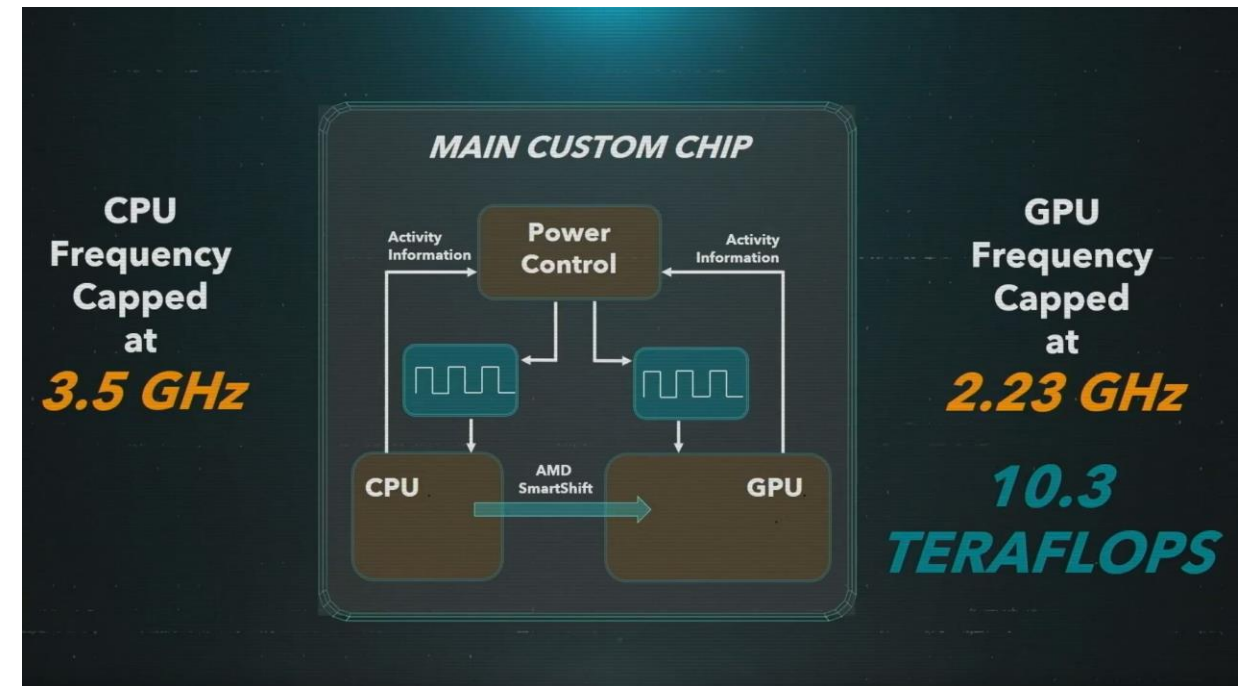
GPU: AMD Radeon RDNA 2

- GPU microarchitecture
- Real-time, hardware accelerated ray tracing
- Infinite Cache: 128MB L3 cache
- Ray accelerator in each compute unit
 - bounding volume hierarchy (BVH) traversal
- HDMI 2.1: 8K videos



AMD SmartShift

- Like a large power pool from which both the CPU and GPU can pull as required
- Relies on infinity fabric controller
- Any work that relies on the combination of a CPU and discrete GPU will benefit



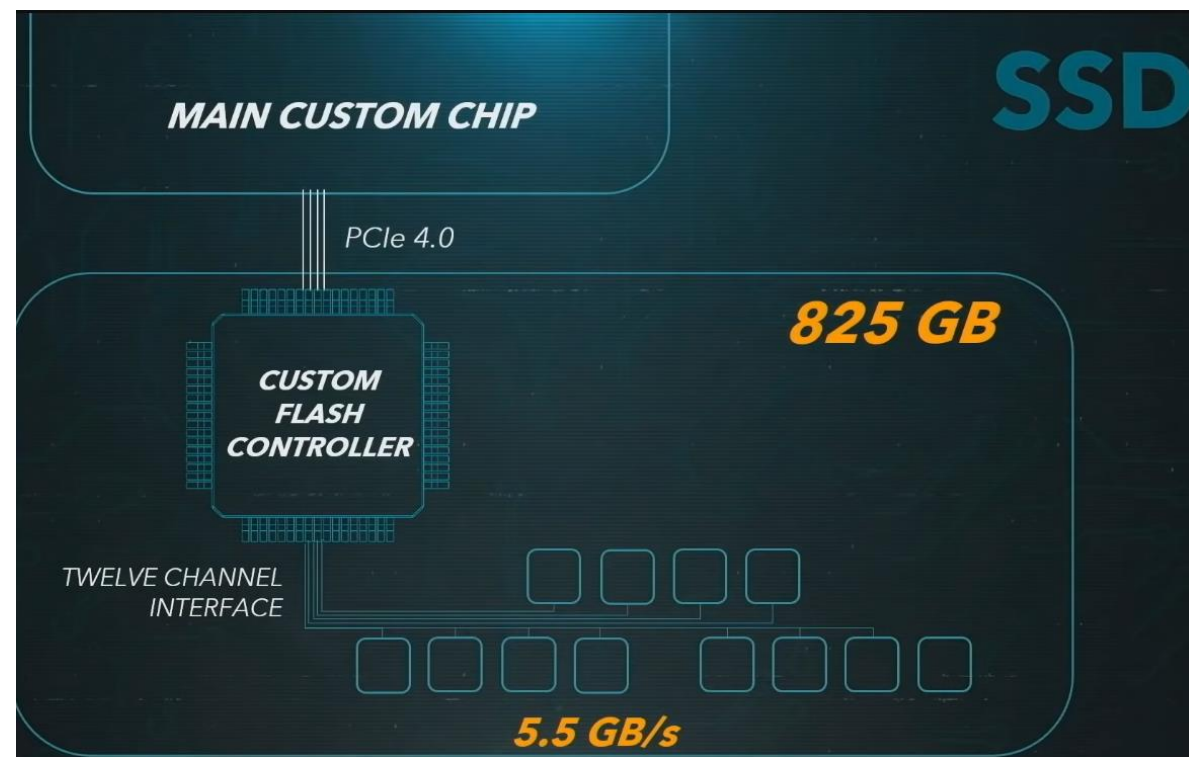
Custom SSD

■ Ordinary PC SSD

- NVMe SSD Controller 8/16/32 channel
- 2 data priority tiers

■ PS5 Custom SSD

- 4 lane PCIe 4.0
- 12 flash channel: 5.5GB/s transfer speed
- PCI-Express 4.0 x4 SSD
- 6 data priority tiers



Custom I/O Unit

- **Kraken decompression unit**

- **Oodle Kraken Compression technology by Epic Games**

- Lossless data compressor

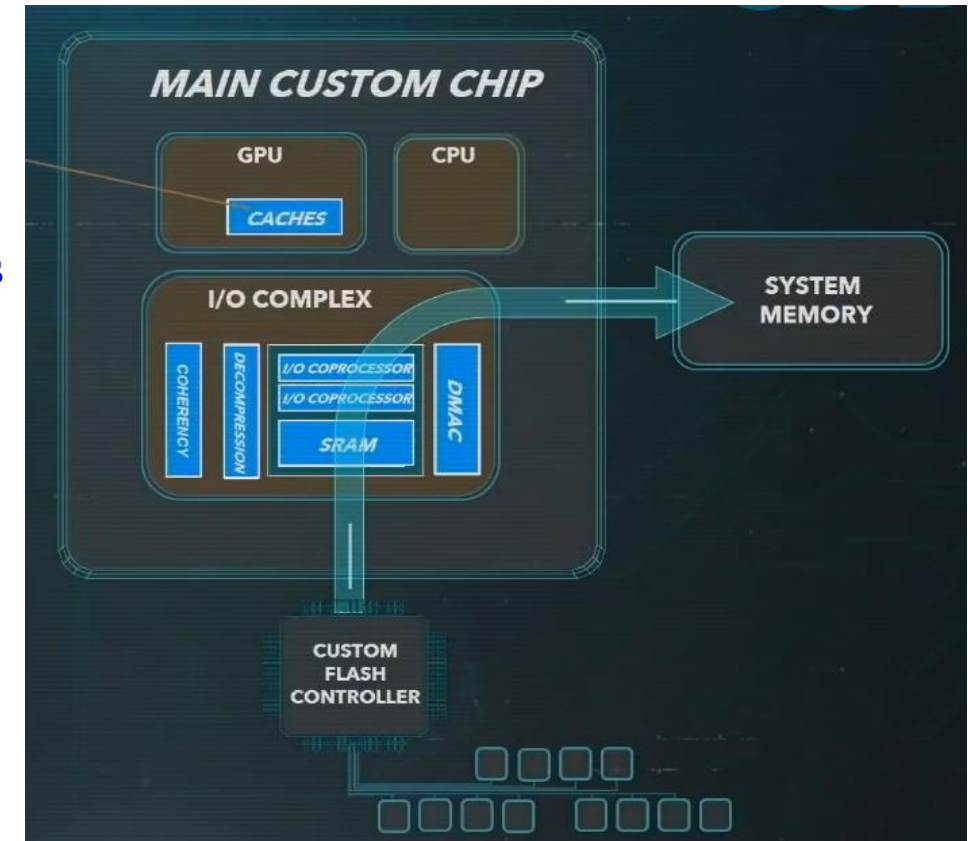
- Faster loading time: loading compressed data + decompress

- **DMA Controller**

- **I/O COPROCESSORS**

- **SRAM**

- **COHERENCY**



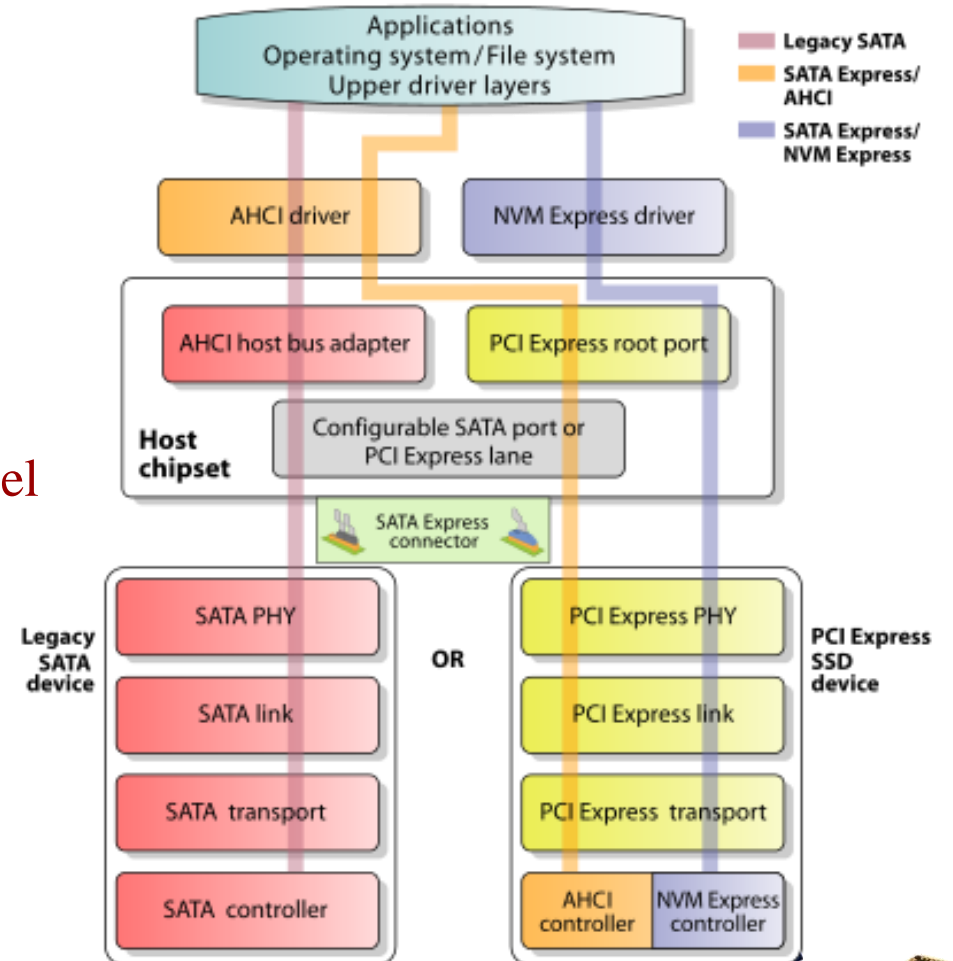
Expansion Storage: M.2. NVME SSD

■ Computer bus interface

- PCIE 4.0
- SATA 3.0
- USB 3.0

■ Logical device interface

- NVMe for PCIE: perform many I/O operations in parallel
- AHCI for SATA





SSD performance

- PS5 version may be smaller than its PS4 version
- Reduce loading time
 - Past
 - Loading scene
 - Characters passing through narrow roads

	PS4 HDD (actual)	PS5 SSD (target)
<i>Bandwidth</i>	50-100MB/s	5 GB/s (at least)
<i>Seek Time</i>	2-50 milliseconds	Instantaneous
<i>Load Time</i>	1GB in 20 seconds	2GB in 0.27 seconds

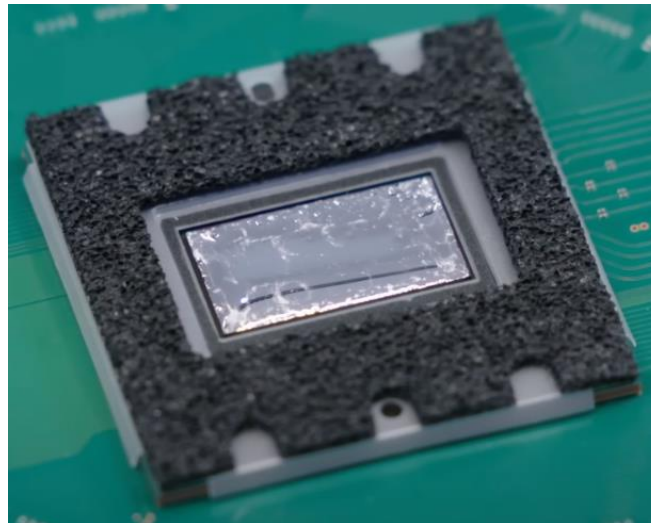
Liquid Metal

■ Heat management

- Thermal Interface Material(TIM): connection between the chip and the heatsink
- Typically using paste-style TIM

■ **Liquid Metal:** ensure long-term, stable, high-cooling performance

- Electronically conductive: risk of short out
- Insulating sheet as a corral



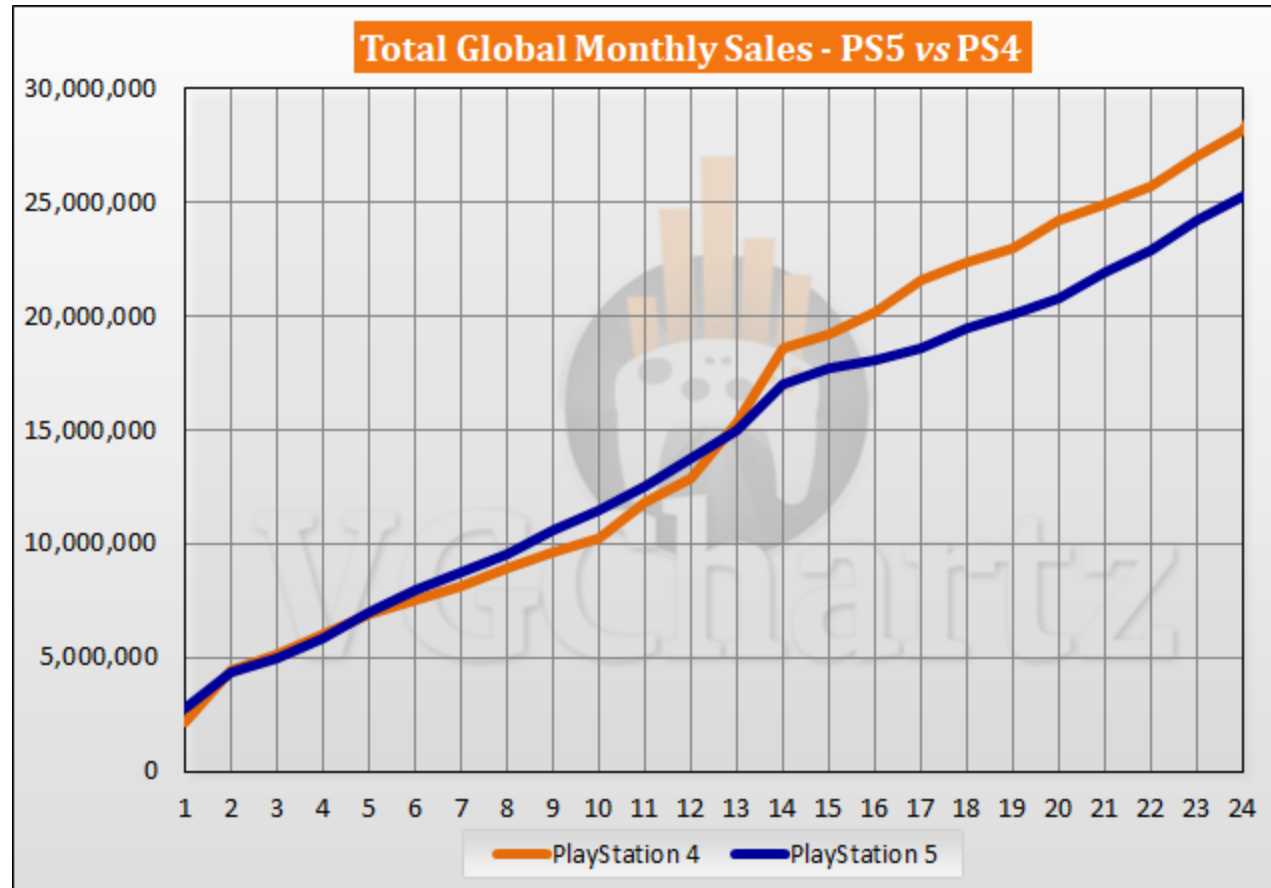


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Global Monthly Sales

■ Chart from VGChartz









PS5 shortcut

- Chip Shortage ever since the beginning of the COVID-19
- The demand is higher than the supply
- Scalpers buy too many consoles to sell them at a higher price
- High global inflation rates: increase price



Sale Comparison

Current	2020	2021	2022	Lifetime
	4,390,029 12.5%	12,608,953 27.7%	9,490,807 30.5%	26,489,789 16.4%
	3,036,468 8.6%	8,231,846 18.1%	7,391,180 23.7%	18,659,494 11.6%
	27,758,846 78.9%	24,748,809 54.3%	14,275,451 45.8%	115,989,806 72.0%
Current Total	35,185,343	45,589,608	31,157,438	161,139,089
Legacy	2020	2021	2022	Lifetime
	8,368,159 74.0%	2,207,717 81.8%	445,075 92.4%	117,023,072 69.5%
	2,934,882 26.0%	490,779 18.2%	36,672 7.6%	51,278,664 30.5%
	469,092 -	34,395 -	- -	75,940,755 -
Legacy Total	11,772,133	2,732,891	481,747	244,242,491
All Total	46,957,476	48,322,499	31,639,185	405,381,580

Competitive Analysis - XBOX

■ Xbox Series X|S

	PS5	XBOX
CPU	x86-64-AMD Ryzen Zen 2 @ 3.5GHz	Custom AMD 8-core Zen 2 @ 3.8GHz
GPU	AMD Radeon RDNA 2 @ 2.23GHz, 10 TFLOPS	Custom AMD 8-core Zen 2 @ 1.85GHz, 12.16 TFLOPS
Memory	GDDR6 SDRAM 16GB	GDDR6 SDRAM 16GB
Internal Storage	Custom 825GB SSD	1 TB SSD
Optical Drive	Ultra HD Blu-ray	-
Price	US\$499	US\$499

■ Console exclusivity

- XBOX: games in XBOX Game Pass can play on PC and XBOX
- PS5: few game exclusivity



Competitive Analysis - Switch

■ Console exclusivity: Nintendo games

- Super Mario
- Zelda

■ Pros

- Easy to carry
- Low price
- Party game

■ Cons

- Low resolution screen
- Low FPS





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SWOT analysis

Strength	Weakness
<ul style="list-style-type: none">• PS4 has the best sales• Best hardware for gaming• Lost of exclusive games• Best game experience	<ul style="list-style-type: none">• High Price• Games on PlayStation have higher price• Shortage• Big console size
Opportunities	Threats
<ul style="list-style-type: none">• People stuck at home since COVID-19<ul style="list-style-type: none">• Play At Home activity• High price of GPU• Support Network connection	<ul style="list-style-type: none">• More PC players• Sales of Nintendo Switch• More Mobile players• Less console exclusivity



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Conclusion

- **PS5 is the good gaming console nowadays**
 - High resolution scene
 - Less loading time
 - Good gaming experience
- **PS5 Shortage & PC gamers increase: fewer people will buy PS5**



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- <https://www.playstation.com/zh-hant-tw/ps5/>
- <https://www.eurogamer.net/ps5-specs-features-ssd-ray-tracing-cpu-gpu-6300>
- <https://www.windowscentral.com/amd-smartshift>
- https://zh.wikipedia.org/zh-tw/PlayStation_5
- <https://zh.wikipedia.org/zh-tw/%E7%AC%AC%E4%B9%9D%E4%B8%96%E4%BB%A3%E6%B8%B8%E6%88%8F%E6%9C%BA>
- <https://hexus.net/tech/news/cpu/131549-the-architecture-behind-amds-zen-2-ryzen-3000-cpus/>
- <https://www.pcworld.com/article/393733/rdna-2-deep-dive-inside-amd-radeon-rx-6000-graphics-cards.html>
- <https://www.pcworld.com/article/393733/rdna-2-deep-dive-inside-amd-radeon-rx-6000-graphics-cards.html>



Reference

- <https://youtu.be/CaAY-jAjm0w>
- <https://youtu.be/cWMIEgsSgDw>
- <https://www.eettaiwan.com/20210104nt61-teardown-of-playstation-5-ifixit/>
- <https://youtu.be/weOCONceK4E>
- <https://venturebeat.com/business/playstation-5-cooling-uses-liquid-metal-heres-why-thats-cool/>
- https://en.wikichip.org/wiki/amd/microarchitectures/zen_2
- <https://www.pcgamesn.com/amd/amd-zen-2-release-date-specs-performance>
- <https://www.4gamer.net/games/990/G999027/20200319173/>
- <https://www.techpowerup.com/forums/threads/sony-reveals-ps5-hardware-rdna2-raytracing-16-gb-gddr6-6-gb-s-ssd-2304-gpu-cores.264881>
- <https://youtu.be/tcyvHP0L9-s>
- <https://youtu.be/Gwat5qIwNjk>