Final Research Report : A Comparison Architecture of AMD Ryzen 5 3600X And Intel Core i5-9600K

CSE-0410 Fall 2021

Rubyat Jesmin Shammi [UG02-47-18-034]
Khondkar Md. Mufrat Tasif [UG02-47-18-044]
Ahasanul Bari Rifat [UG02-47-18-007]
Department of Computer Science and Engineering
State University of Bangladesh (SUB)
Dhaka, Bangladesh

***Abstract*—The AMD Ryzen 5 3600X will likely be a popular addition to the Ryzen family.The architecture at the heart of the Ryzen 5 3600X is unlike any before it, topologically speaking.**

The Intel Core i5-9600K Processor with the most popular Processors. Components that offer the best value for money have great performance and a low price in market.

***Index Terms*—AMD Ryzen 5 3600X, Intel Core i5-9600K**

I. What is Processor ?

Processor is a logic circuit that's responds to and process the basic instruction that drive a computer. Without a processor computers could not run any types of program. It's performs logical, input/output and others basic instructions that are passed from an operating system.

II. About AMD Ryzen 5 and Intel core-i5

AMD Ryzen 5 3600X has two third-generation Ryzen 5 chips based on AMD latest Zen 2 micro architecture, one of is Ryzen 5 3600X. This one is few good features have been added to this version than the previous one.

Intel Core i5 9600K is 64-bit Hexes-core mid-range performance x86 desktop micro processor introduced by Intel in late 2018. This chips has dual channel of max 128 GB of size that's support DDR4-2666 bus speed.

III. Literature Review ?

Among all the different brands the two biggest companies considered competitors are Intel and AMD. Even both of the companies even continues to constantly make changes and improvements in their products in an attempts to remain competitive.

Founded in 1969 as a Silicon Valley start-up, the AMD journey began with dozens of employees focused on leading-edge semiconductor products. AMD today develops high-performance computing and visualization products to solve some of the world's toughest and most interesting challenges.

The first Intel Core desktop processor—and typical family member, a 65 manometer dual-core design fabricated brought to market in July 2006.Since 2019, The lineup of Intel Core processors includes the Intel Core i3, Intel Core i5 CPUs. They come in multiple generations like 9th, 10th, and 11th, also called Coffee Lake, Comet/Ice Lake, and Rocket/Tiger Lake.

IV. KEY FEATURES

For AMD Ryzen 5 3600X :
AMD Ryzen™ Processors
AMD Ryzen™ 5 Desktop Processors
Code name : "Matisse"
Processor Number : 5-3600X
CPU Cores 6 and Threads 12
Base Clock 3.8GHz
Max. Boost Clock Up to 4.4GHz
L2 Cache 3MB , L3 Cache 32MB
PCI Version PCIe: 4.0 x16
System Memory Type: DDR4-3200
For Intel Core i5-9600K :
9th Generation Intel® Core™ i5 Processors
Products formerly Coffee Lake
Vertical Segment: Desktop
Processor Number : i5-9600K
Lithography 14 nanometer
Total Cores 6 , Total Threads 6
Max Turbo Frequency 4.60 GHz
Bus Speed 8 GT/s
Memory Types DDR4-2666
Max Memory Bandwidth 41.6 GB/s

V. Ryzen 5 3600X and Core i5-9600K SPECS : GENERAL

For Ryzen 5 3600X :
Platform - Boxed Processor
Product Family - AMD Ryzen™ Processors
Product Line - AMD Ryzen™ 5 Desktop Processors
CPU Socket - AM4
Launch Date - 7/7/2019
For Core i5-9600K :
Code Name - Products formerly Coffee Lake
Vertical Segment - Desktop

Launch Date - Q4'18
Use Conditions - PC/Client/Tablet
Lithography - 14 nm

VI. Ryzen 5 3600X and Core i5-9600K Specs :PERFORMANCE Clock Speed

For Ryzen 5 3600X :
CPU Cores 6 Threads - 12
Max. Boost Clock Up to - 4.4GHz
Base Clock - 3.8GHz
Total L1 Cache - 384KB
Total L2 Cache - 3MB
Total L3 Cache - 32MB
Default TDP - 95W
System Memory Specification - Up to 3200MHz
For Core i5-9600K :
Total Cores 6 and Total Threads 6
Max Turbo Frequency - 4.60 GHz
Intel® Turbo Boost Technology 2.0 Frequency - 4.60 GHz
Processor Base Frequency - 3.70 GHz
Cache - 9 MB Intel® Smart Cache
Max Memory Size (dependent on memory type) - 128 GB
Memory Types - DDR4-2666
Processor Graphics - Intel® UHD Graphics 630

VII. A PC Build with AMD Ryzen 5 3600X

1. CPU - AMD Ryzen 5 3600X 3.8 GHz 6-Core
2. Storage - Western Digital Blue SN550 1 TB M.2-2280 NVME SSD (2)
3. Motherboard - MSI MAG B550M MORTAR WIFI Micro ATX AM4
4. Memory - Corsair Vengeance RGB Pro 32 GB (2 x 16 GB) DDR4-3600 CL18
5. Video Card - MSI GeForce RTX 3070 8 GB GAMING X TRIO
6. Power Supply - Corsair RM (2019) 650 W 80+ Gold Certified Fully Modular ATX
7. Case - Thermaltake S100 Snow Edition MicroATX Mini Tower
8. CPU Cooler - Noctua NH-U12S chromax.black 55 CFM
9. Operating System - Microsoft Windows 10 Pro OEM 64-bit
10. Case Fan - Noctua P12 redux-1700 PWM 70.75 CFM 120 mm (4)
Cooler Master MasterFan MF120R 59 CFM 120 mm (2)
Cost All of 250000 Taka. (Gaming PC)

VIII. A PC Build with Core i5-9600K

1. CPU - Intel Core i5-9600K 3.7 GHz 6-Core OEM/Tray
2. Storage - Corsair Force MP500 480 GB M.2-2280 NVME SSD
3. Motherboard - MSI MAG Z390 TOMAHAWK ATX LGA1151
4. Memory - Corsair Vengeance RGB Pro 16 GB (2 x 8 GB) DDR4-3200 CL14
5. Video Card - Asus GeForce GTX 1080 Ti 11 GB STRIX GAMING
6. Power Supply - SeaSonic FOCUS Plus Platinum 750 W 80+ Platinum Certified Fully Modular ATX
7. Case - Lian Li PC-O11 Dynamic ATX Full Tower
8. CPU Cooler - NZXT Kraken X62 Liquid
9. Operating System - Microsoft Windows 10 Pro OEM 64-bit
10. Case Fan - Corsair LL120 43.25 CFM 120 mm
11. Keyboard - Corsair STRAFE RGB Wired Gaming
12. Mouse - Logitech G903 Wireless Optical
Cost All of - 102050 Taka.

IX. Performance

If we are think in gaming :
AMD Ryzen 5 processors are generally slightly less powerful than i5 processors. They have a clock speed of up to 4.4GHz, compared to the 4.6GHz of the i5. But they do have twice as many threads.

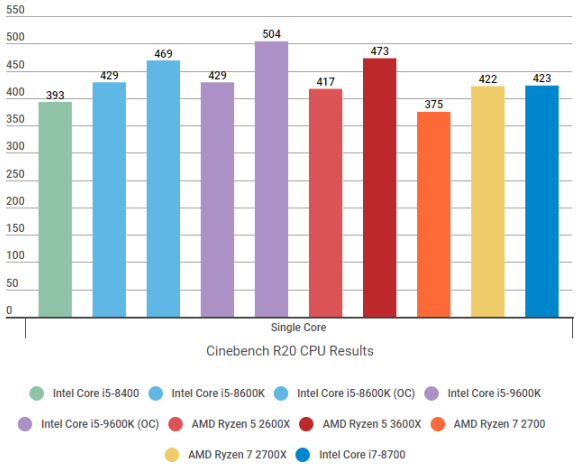

Fig. 1. Ryzen 5 3600X and Core i5-9600K Reference

X. Is i5 9600K good for gaming ? :

The processor clearly provides the best performance for gaming at its price point, though AMD alternatives are enticing if you're more interested in productivity applications.

XI. Should I buy 9600k? :

Unless you are going with a graphics card that is a RTX 2080ti or better, you should use the i5 9600k. Have experience soldering and repairing circuit boards.

XII. Is the Ryzen 5 better than Core i5?:

AMD Ryzen 5 processors are generally slightly less powerful than i5 processors. They have a clock speed of up to 4.4GHz, compared to the 4.6GHz of the i5.

XIII. AMD and Intel who processor better?

AMD Ryzen 5 processor is good effective for gaming multi-tasking. That's why I have interested to work with it. In the battle of high-end AMD vs Intel CPUs, AMD's Ryzen 5 and Ryzen 7 families square off against Intel's Core i5 and Core i7 lineup. Here Intel holds plenty of platform advantages.

XIV. Advantages of AMD processors

The most interesting is undoubtedly the excellent price-performance ratio. they can work with ease and offer a fantastic experience with any current application, including games.Its consumption is too much less They come with fairly adjusted working frequencies that we can increase effortlessly with Ryzen Master Too land without having to invest a lot of money in buying a high-end motherboard.

XV. Advantages of Intel processors

You will reach higher working frequencies. You have more space to overclock. The cache latency's are lower. Less dependence on the frequency of the RAM memory.

XVI. Disadvantages of AMD processors

The most relevant is to be lower performance in single wire supplication's already mentioned, the working frequencies are not as high as with the Intel Core processors. It's not serious as they compensate for it with better value for money.

XVII. Disadvantages of Intel processors

It prevents jumps in the manufacturing process with a high number of cores. It has higher production level costs. It does not allow the same level of utilization of faulty chips.

XVIII. WHICH GENERATION IS AMD RYZEN 5 3600X

The AMD Ryzen 5 3600X 3.8 GHz Six-Core AM4 Processor is a powerful six-core processor with 12 threads, designed for socket AM4 motherboards. Built with Zen 2 architecture, the third-generation 7nm Ryzen processor offers increased performance compared to its predecessor.

XIX. WHICH GENERATION IS Intel Core i5-9600K

Core i5-9600K is a 64-bit hexa-core mid-range performance x86 desktop microprocessor introduced by Intel in late 2018. The Intel Core i5-9600K desktop processor delivers the ultimate in performance with Turbo to handle the heaviest tasks.

XX. Motivation

AMD Ryzen 5 processor are good effective for gaming multi-tasking. That's why we have interested to work with this.

On the other hand, Intel core i5-9600K is already used for office work daily uses. For this reason We are working with this.

XXI. Scopes And Limitations

Scopes:

1. We can find out which one is more better in daily life .
2. We can detect the area of upgrade and difference.

Limitation:

We can only find out which parts will difference between of them . So this comparison will not be accurate. It is depends on the comparison measures topic.

XXII. Importance of Research

Research is essential to find out which treatments work better for patients. It plays an important role in discovering new treatments, and making sure that we use existing treatments in the best possible ways.

Understanding that research is important might seem like a no-brainer, but many people avoid it like the plague.

Research Is Necessary and Valuable in Our Daily Lives because :

1. It's a tool for building knowledge and facilitating learning - Research is required not just for students and academics but for all professionals and nonprofessionals alike. It is also important for budding and veteran writers, both offline and online.

2. It's a means to understand issues and increase public awareness - This might look like living in jail or in a drug rehabilitation center for a while, gaining or losing a significant amount of weight, or learning to captain a sailboat. Many read literature, biographies, or journals to have a better view or context of the story they've been hired to tell.

3. It helps us succeed in business - Research benefits business. Many successful companies, such as those producing consumer goods or mass-market items, invest in research and development, or R and D. Different industries that involve science and engineering processes (like agriculture, food and beverage, manufacturing, healthcare and pharmaceuticals, computer software, semiconductor, information and communication technology, construction, robotics of their products and services.

4. It allows us to disprove lies and support truths - Have we ever experienced the feeling that our partner is having an affair behind our back? Some people would overlook this and say that it's better not to know; others though would take discreet action, hiring a private detective to find out for sure.

5. It is a means to find, gauge, and seize opportunities - Research helps people nurture their potential and achieve goals by taking advantage of various opportunities. This can mean securing employment, being awarded scholarships or grants, securing project funding,finding budget travel opportunities, or securing other little wins.

6. It promotes a love of and confidence in reading, writing, analyzing, and sharing valuable information - Research entails both reading and writing. These two literacy functions help maintain critical thinking and comprehension. Without these skills, research is far more difficult.

7. It provides nourishment and exercise for the mind - Research helps students develop critical reasoning skills, helpful for any field of higher education. Keeping the mind active may also help prevent certain mental illnesses

Conclution

When using a CPU, our concerns are broadly cut along the lines of having a speedy computer, that enables the smooth operations of your rendering and creating needs. Who is ever in love with a dull computer by the way? Therefore, this CPU must have plenty of cores, and threads.

The availability of cores and threads will guarantee the smooth creation of contents on your computer and give you just enough room to do other high-end computing operations, like gaming and probably running designs on Computer.

ACKNOWLEDGMENT

I would like to thank my honourable **Mustasir Hasan Kanchan, Sir** for his time, generosity and critical insights into this Research Review.

REFERENCES

[1] Hilbert, Hagedoorn. "Intel Core i5 9600K processor review." October 19, (2018).

[2] Areej. "AMD Ryzen 5 3600X 10 percent Faster than Intel Core i5-9600K in Gaming, 25 percent in Multi-Threaded Tasks." July 01, (2019).

[3] Surya, Kumar. "A Comparative Study of best processors: Intel and AMD". July, (2019)

[4] Paul, Alcorn. "AMD Ryzen 5 3600X: The Mid Range CPU Leader." July 28(2019).

[5] Mukesh Kashyap. "Which one is good for gaming and streaming with some video editing, AMD Ryzen 5 or Intel i5? " September 17, 2019.