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# Core i9 12900K AVX-512 Alder Lake Benchmarks

12700k comparison vs original testing by Mich L. of AVX-512 12900k performance

**Automated Executive Summary**

*i9-12900K P-Cores + AVX-512 had the most wins, coming in first place for 75% of the tests.*

*Based on the geometric mean of all complete results, the fastest (i9-12900K P-Cores + AVX-512) was 1.921x the speed of the slowest (i9-12900K P-Cores). i9-12900K was 0.724x the speed of i9-12900K P-Cores + AVX-512, Intel Core i7-12700K was 0.868x the speed of i9-12900K, i9-12900K P-Cores was 0.828x the speed of Intel Core i7-12700K.*

*The results with the greatest spread from best to worst included:*

*Cpuminer-Opt (Algorithm: Myriad-Groestl) at 2.88x*
*Cpuminer-Opt (Algorithm: LBC, LBRY Credits) at 2.621x*
*Cpuminer-Opt (Algorithm: Quad SHA-256, Pyrite) at 2.237x*
*Cpuminer-Opt (Algorithm: Blake-2 S) at 2.124x*
*Cpuminer-Opt (Algorithm: Triple SHA-256, Onecoin) at 2.061x*
*Cpuminer-Opt (Algorithm: Garlicoin) at 1.969x*
*Cpuminer-Opt (Algorithm: Skeincoin) at 1.639x*
*Stockfish (Total Time) at 1.526x*
*Cpuminer-Opt (CPU Temperature Monitor) at -1x*

*Cpuminer-Opt (CPU Power Consumption Monitor) at -1x.*

# Test Systems:

## i9-12900K

Processor: Intel Core i9-12900K @ 6.50GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (0702 BIOS), Chipset: Intel Device 7aa7, Memory: 64GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: Gigabyte AMD Radeon RX 6800/6800 XT / 6900 16GB (2575/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 21.10, Kernel: 5.15.0-051500rc6daily20211023-generic (x86_64) 20211022, Desktop: GNOME Shell 40.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 22.0.0-devel (git-c2d522b 2021-10-23 impish-oibaf-ppa) (LLVM 12.0.1 DRM 3.42 5.15.0-051500rc6daily20211023-generic), Vulkan: 1.2.195, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native" CFLAGS="-O3 -march=native"
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-gcn/usr --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x12 - Thermald 2.4.6
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB
Python Notes: Python 3.9.7
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## i9-12900K P-Cores

## i9-12900K P-Cores + AVX-512

Processor: Intel Core i9-12900K @ 6.50GHz (8 Cores / 16 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (0702 BIOS), Chipset: Intel Device 7aa7, Memory: 64GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0, Graphics: Gigabyte AMD Radeon RX 6800/6800 XT / 6900 16GB (2575/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 21.10, Kernel: 5.15.0-051500rc6daily20211023-generic (x86_64) 20211022, Desktop: GNOME Shell 40.5, Display Server: X Server 1.20.13 + Wayland, OpenGL: 4.6 Mesa 22.0.0-devel (git-c2d522b 2021-10-23 impish-oibaf-ppa) (LLVM 12.0.1 DRM 3.42 5.15.0-051500rc6daily20211023-generic), Vulkan: 1.2.195, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Environment Notes: CXXFLAGS="-O3 -march=native" CFLAGS="-O3 -march=native"
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-ZPT0kp/gcc-11-11.2.0/debian/tmp-gcn/usr --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64

--with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x12 - Thermald 2.4.6
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB
Python Notes: Python 3.9.7
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

## Intel Core i7-12700K

Processor: Intel Core i7-12700K @ 5.00GHz (12 Cores / 20 Threads), Motherboard: MSI PRO Z690-A DDR4(MS-7D25) v1.0 (1.00 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 500GB Western Digital WDS500G2B0C-00PXH0 + 3 x 10001GB Seagate ST10000DM0004-1Z + 128GB HP SSD S700 Pro, Graphics: MSI AMD Radeon RX 5600 XT 6GB (1500MHz), Audio: Realtek ALC897, Monitor: LG HDR WQHD, Network: Intel Device 15f3

OS: Pop 20.04, Kernel: 5.14.0-1008-oem (x86_64), Desktop: GNOME Shell 3.36.7, Display Server: X Server 1.20.11, OpenGL: 4.6 Mesa 21.2.2 (LLVM 12.0.0), OpenCL: OpenCL 1.2 Intel FPGA SDK for OpenCL 20.3 + OpenCL 3.0 LINUX + OpenCL 3.0, Vulkan: 1.2.182, Compiler: GCC 9.4.0 + Intel oneAPI DPC++/C++ Compiler 2021.4.0 (2021.4.0.20210924) + ICC 2021.4.0 20210910 + CUDA 10.2, File-System: ext4, Screen Resolution: 3440x1440

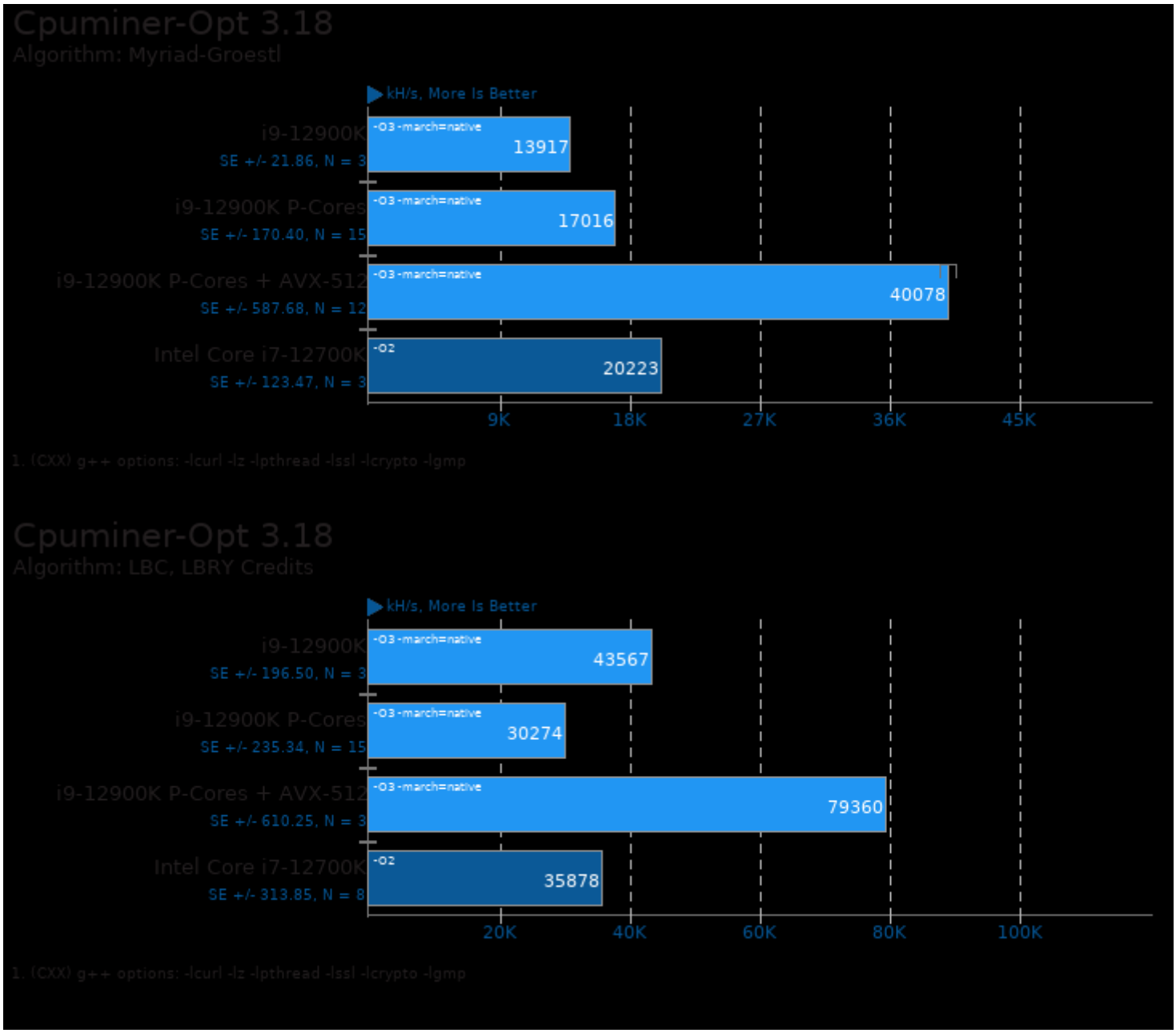
Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-yTrUTS/gcc-9-9.4.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0xf - Thermald 1.9.1
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

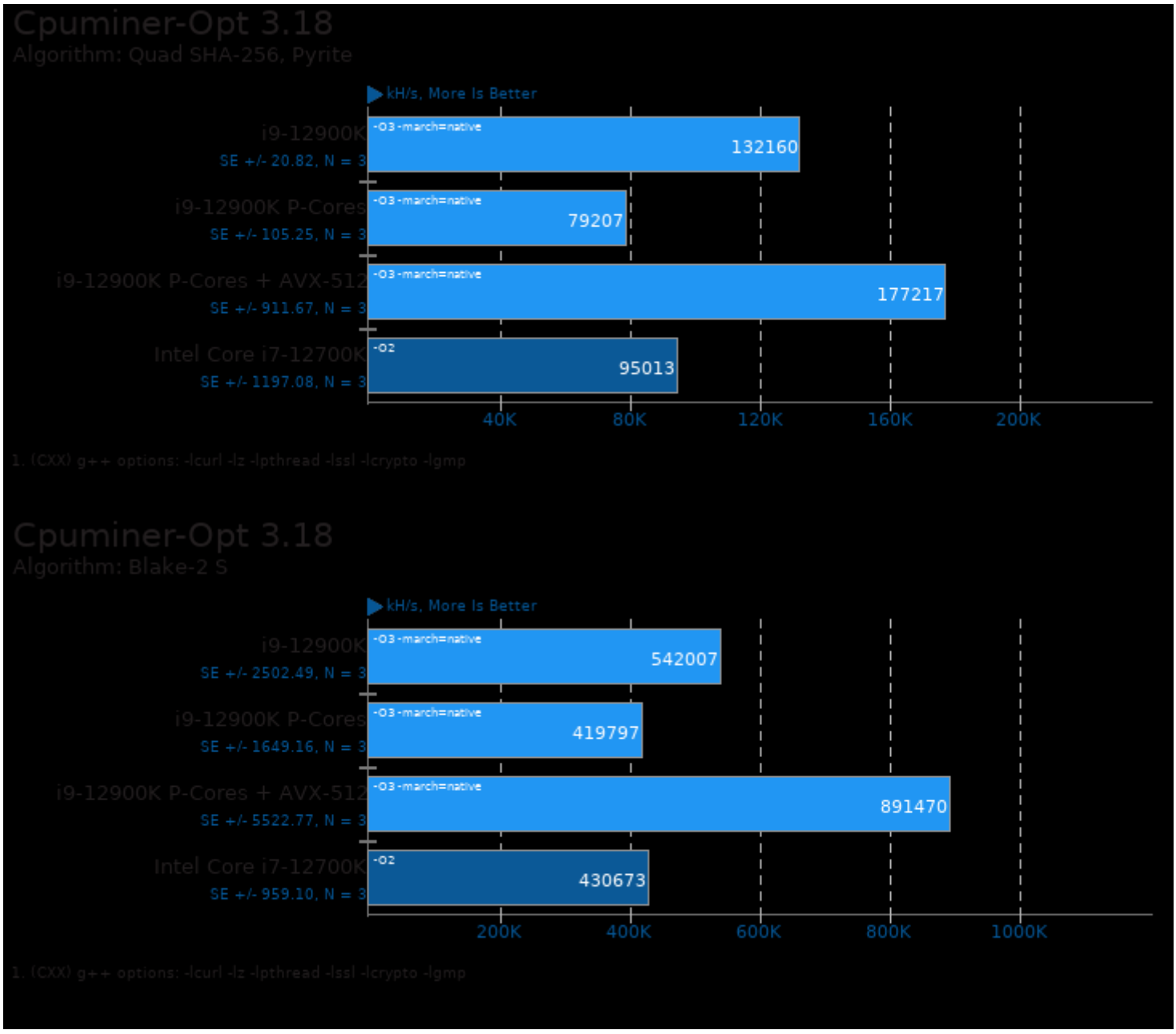
| | i9-12900K | i9-12900K P-Cores | i9-12900K P-Cores + AVX-512 | Intel Core i7-12700K |
|---|---|---|---|---|
| **Cpuminer-Opt - Myriad-Groestl (kH/s)** | **13917** | 17016 | **40078** | 20223 |
| **Normalized** | 34.72% | 42.46% | 100% | 50.46% |
| **Standard Deviation** | 0.3% | 3.9% | 5.1% | 1.1% |
| **Cpuminer-Opt - LBC, LBRY Credits (kH/s)** | 43567 | **30274** | **79360** | 35878 |
| **Normalized** | 54.9% | 38.15% | 100% | 45.21% |
| **Standard Deviation** | 0.8% | 3% | 1.3% | 2.5% |
| **Cpuminer-Opt - Q.S.2.P (kH/s)** | 132160 | **79207** | **177217** | 95013 |
| **Normalized** | 74.58% | 44.69% | 100% | 53.61% |
| **Standard Deviation** | 0% | 0.2% | 0.9% | 2.2% |
| **Cpuminer-Opt - Blake-2 S (kH/s)** | 542007 | **419797** | **891470** | 430673 |
| **Normalized** | 60.8% | 47.09% | 100% | 48.31% |
| **Standard Deviation** | 0.8% | 0.7% | 1.1% | 0.4% |
| **Cpuminer-Opt - T.S.2.O (kH/s)** | **264873** | **128547** | 246997 | 185503 |
| **Normalized** | 100% | 48.53% | 93.25% | 70.03% |
| **Standard Deviation** | 0.8% | 0.5% | 0.5% | 0.2% |
| **Cpuminer-Opt - Garlicoin (kH/s)** | 2902 | **2515** | **4953** | 3103 |
| **Normalized** | 58.6% | 50.78% | 100% | 62.65% |
| **Standard Deviation** | 0.5% | 2.6% | 0.6% | 1.6% |
| **Cpuminer-Opt - Skeincoin (kH/s)** | 115290 | **75593** | **123903** | 92027 |

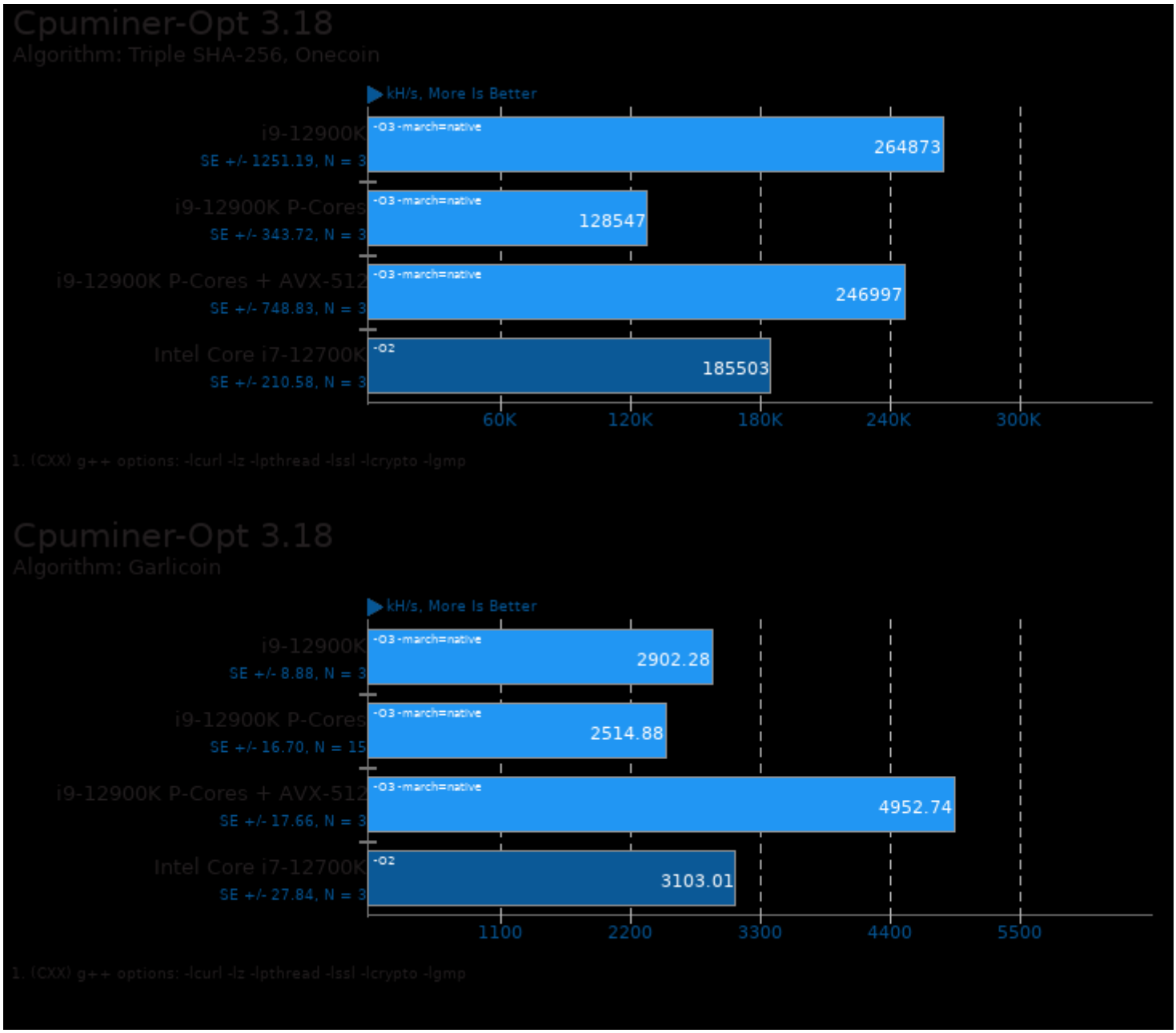
# Core i9 12900K AVX-512 Alder Lake Benchmarks

| | | | | |
|---|---|---|---|---|
| **Normalized** | 93.05% | 61.01% | 100% | 74.27% |
| **Standard Deviation** | 1.1% | 0.2% | 2.2% | 0.6% |
| **Stockfish - Total Time (Nodes/s)** | **48294830** | **31639934** | 32217882 | 38151887 |
| **Normalized** | 100% | 65.51% | 66.71% | 79% |
| **Standard Deviation** | 2.9% | 2.6% | 0.4% | 2.3% |
| **Cpuminer-Opt - LBC, LBRY Credits (kH/s/Watt)** | 326.666 | **185.471** | **526.214** | |
| **Normalized** | 62.08% | 35.25% | 100% | |
| **Cpuminer-Opt - Skeincoin (kH/s/Watt)** | **1301** | **552.521** | 926.958 | |
| **Normalized** | 100% | 42.45% | 71.22% | |
| **Cpuminer-Opt - Garlicoin (kH/s/Watt)** | 16.088 | **14.518** | **25.276** | |
| **Normalized** | 63.65% | 57.44% | 100% | |
| **Cpuminer-Opt - Blake-2 S (kH/s/Watt)** | 7393 | **3706** | **7454** | |
| **Normalized** | 99.18% | 49.72% | 100% | |
| **Cpuminer-Opt - Myriad-Groestl (kH/s/Watt)** | 114.129 | **108.666** | **242.276** | |
| **Normalized** | 47.11% | 44.85% | 100% | |
| **Cpuminer-Opt - Q.S.2.P (kH/s/Watt)** | **1632** | **613.984** | 1335 | |
| **Normalized** | 100% | 37.63% | 81.82% | |
| **Cpuminer-Opt - T.S.2.O (kH/s/Watt)** | **3630** | **1151** | 1919 | |
| **Normalized** | 100% | 31.71% | 52.87% | |
| **Stockfish - Total Time (Nodes/s/Watt)** | **253756** | 186824 | **173452** | |
| **Normalized** | 100% | 73.62% | 68.35% | |

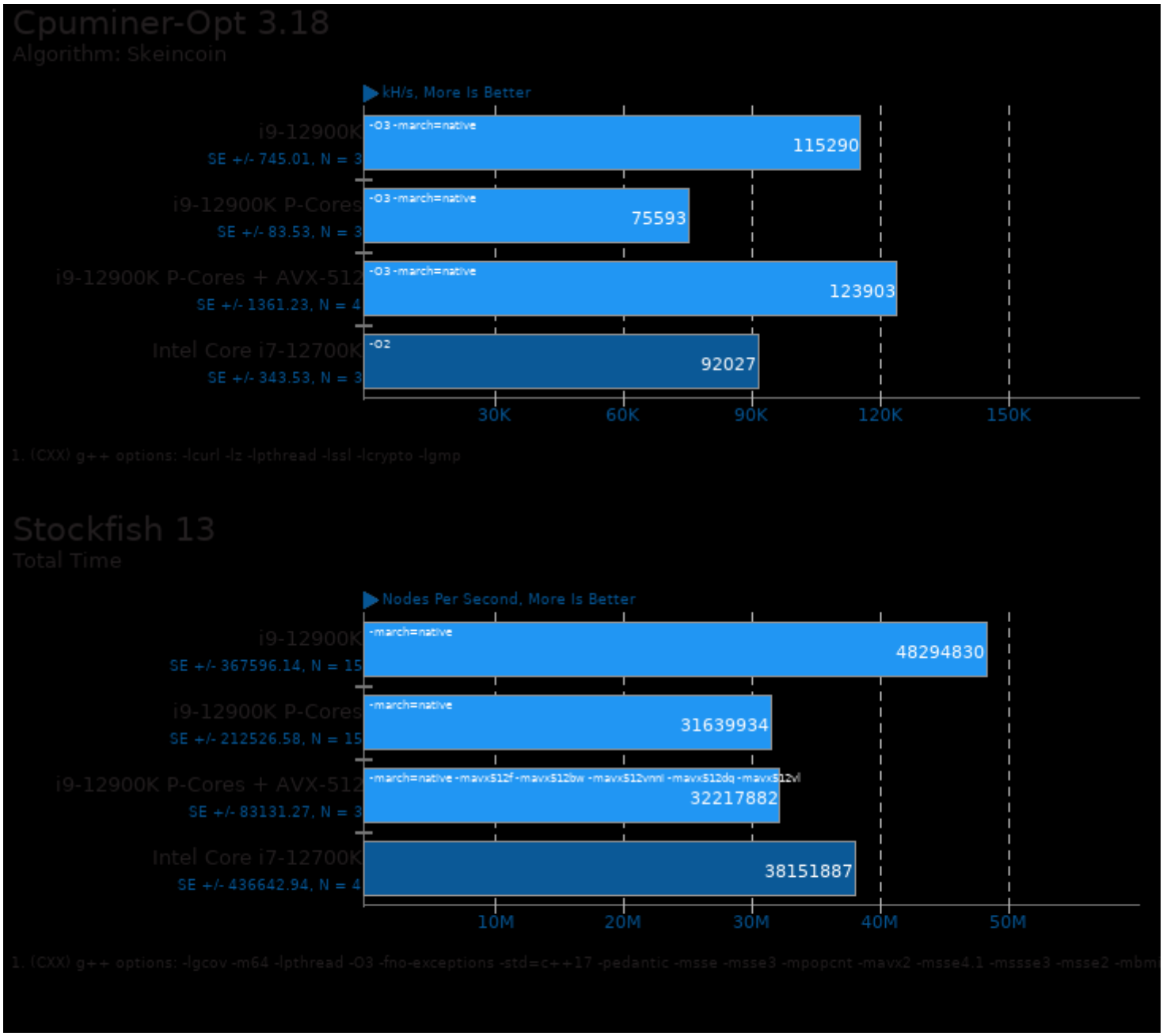
# Core i9 12900K AVX-512 Alder Lake Benchmarks




Cpuminer-Opt 3.18
Algorithm: Quad SHA-256, Pyrite
kH/s, More Is Better
i9-12900K
SE +/- 20.82, N = 3
-O3 -march=native
132160
i9-12900K P-Cores
SE +/- 105.25, N = 3
-O3 -march=native
79207
i9-12900K P-Cores + AVX-512
SE +/- 911.67, N = 3
-O3 -march=native
177217
Intel Core i7-12700K
SE +/- 1197.08, N = 3
-O2
95013
40K
80K
120K
160K
200K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Blake-2 S
kH/s, More Is Better
i9-12900K
SE +/- 2502.49, N = 3
-O3 -march=native
542007
i9-12900K P-Cores
SE +/- 1649.16, N = 3
-O3 -march=native
419797
i9-12900K P-Cores + AVX-512
SE +/- 5522.77, N = 3
-O3 -march=native
891470
Intel Core i7-12700K
SE +/- 959.10, N = 3
-O2
430673
200K
400K
600K
800K
1000K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp


Cpuminer-Opt 3.18
Algorithm: Triple SHA-256, Onecoin
kH/s, More Is Better
i9-12900K
SE +/- 1251.19, N = 3
-O3 -march=native
264873
i9-12900K P-Cores
SE +/- 343.72, N = 3
-O3 -march=native
128547
i9-12900K P-Cores + AVX-512
SE +/- 748.83, N = 3
-O3 -march=native
246997
Intel Core i7-12700K
SE +/- 210.58, N = 3
-O2
185503
60K
120K
180K
240K
300K
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp
Cpuminer-Opt 3.18
Algorithm: Garlicoin
kH/s, More Is Better
i9-12900K
SE +/- 8.88, N = 3
-O3 -march=native
2902.28
i9-12900K P-Cores
SE +/- 16.70, N = 15
-O3 -march=native
2514.88
i9-12900K P-Cores + AVX-512
SE +/- 17.66, N = 3
-O3 -march=native
4952.74
Intel Core i7-12700K
SE +/- 27.84, N = 3
-O2
3103.01
1100
2200
3300
4400
5500
1. (CXX) g++ options: -lcurl -lz -lpthread -lssl -lcrypto -lgmp

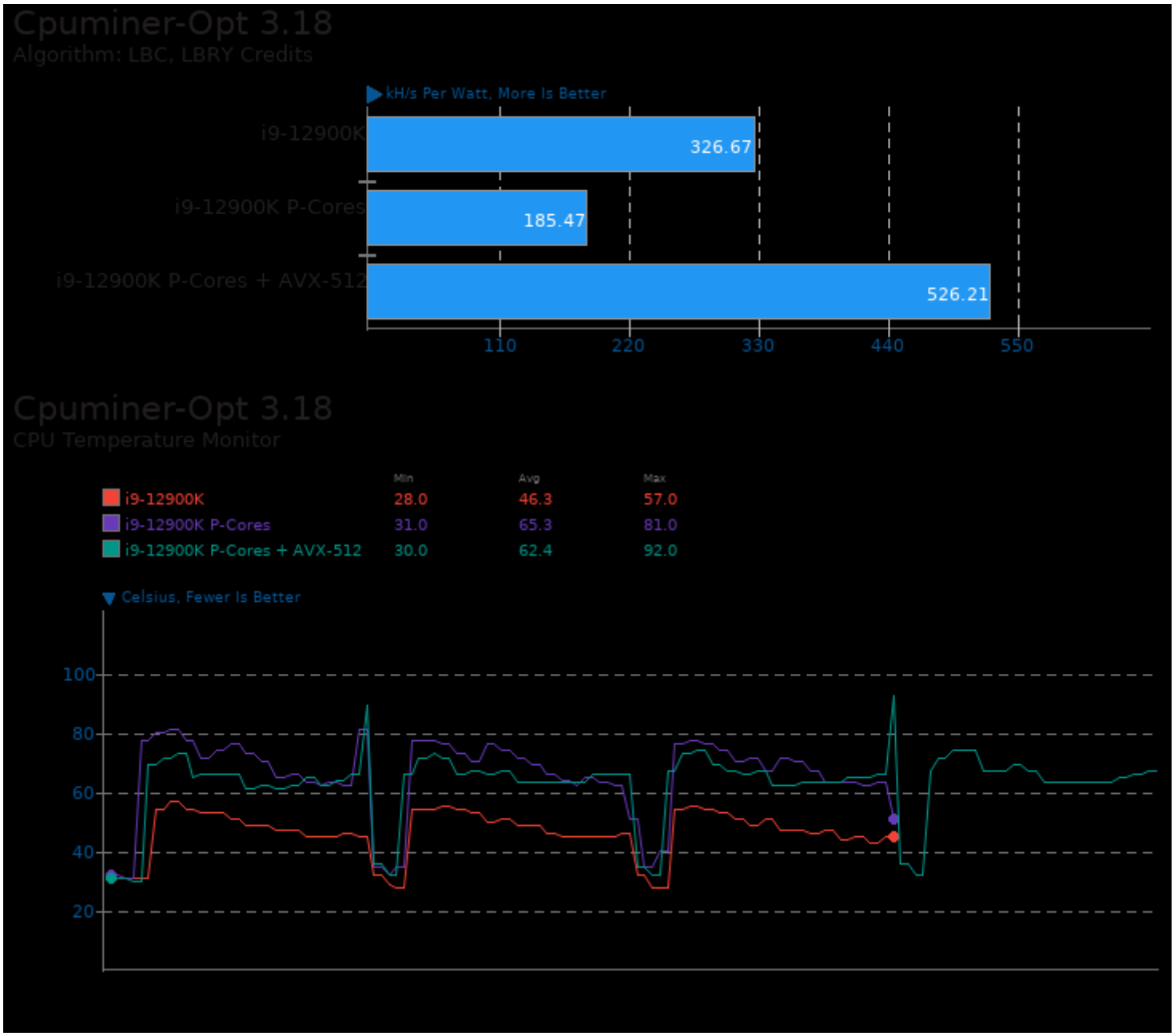
# Core i9 12900K AVX-512 Alder Lake Benchmarks



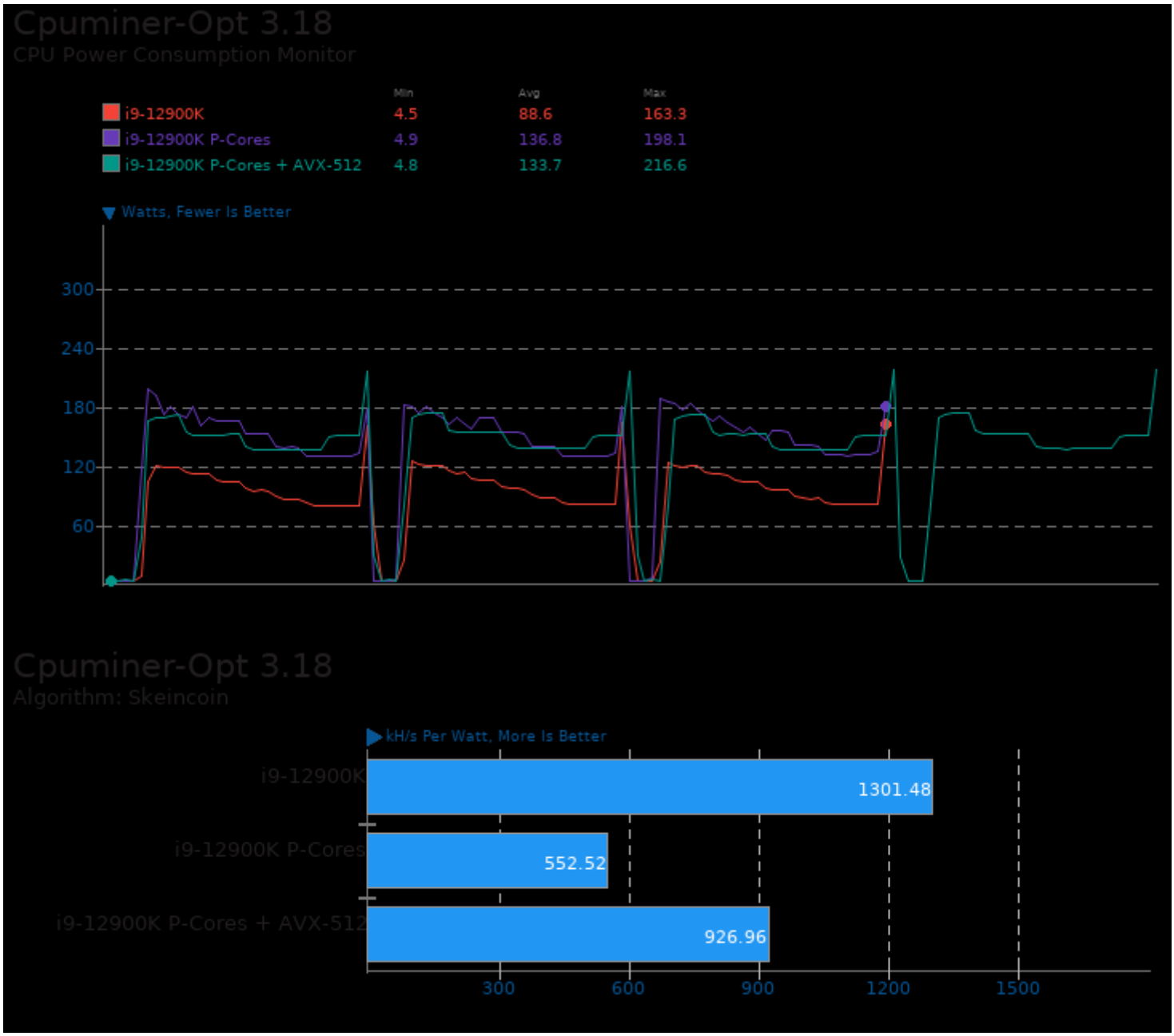
# Core i9 12900K AVX-512 Alder Lake Benchmarks



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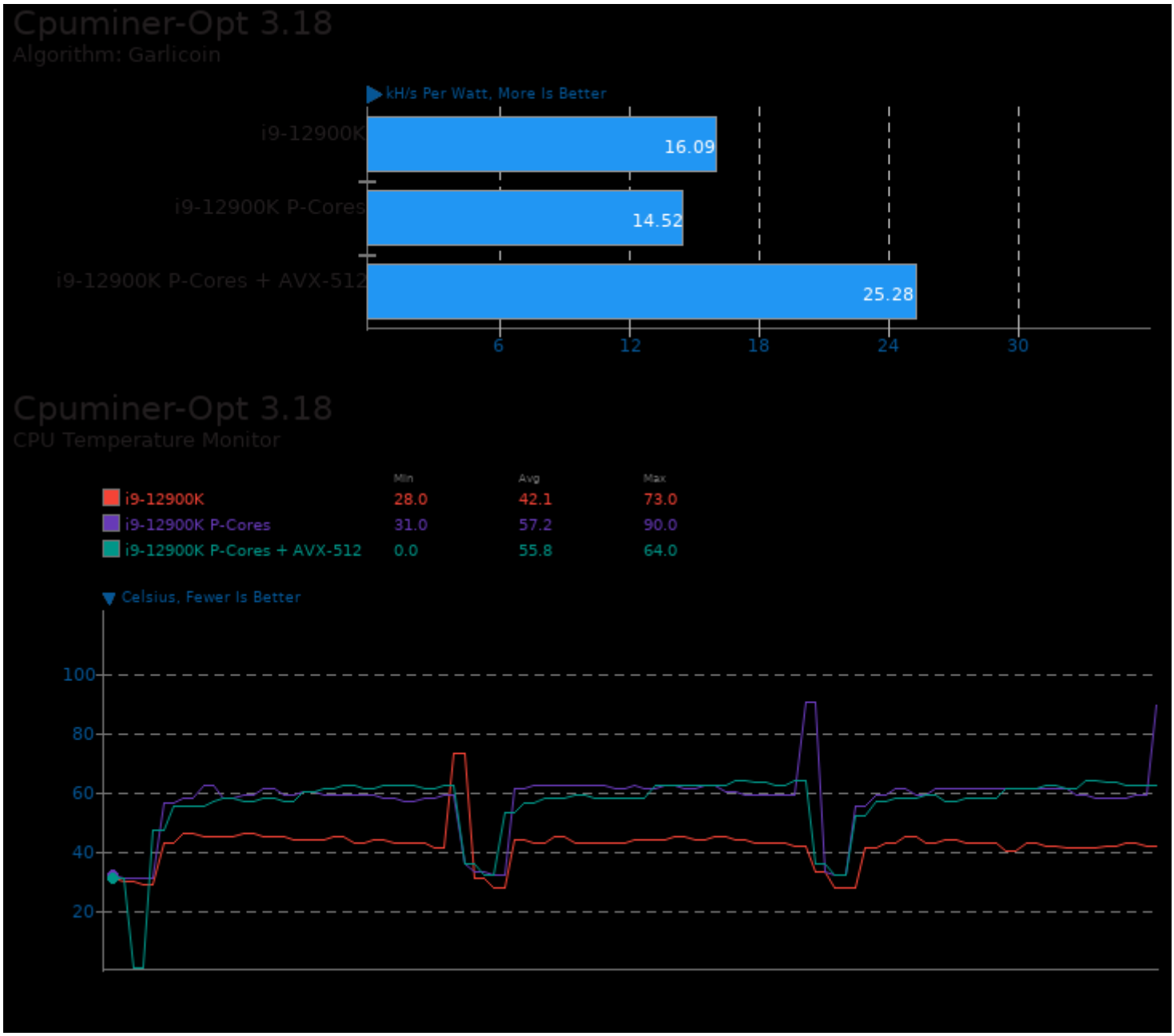
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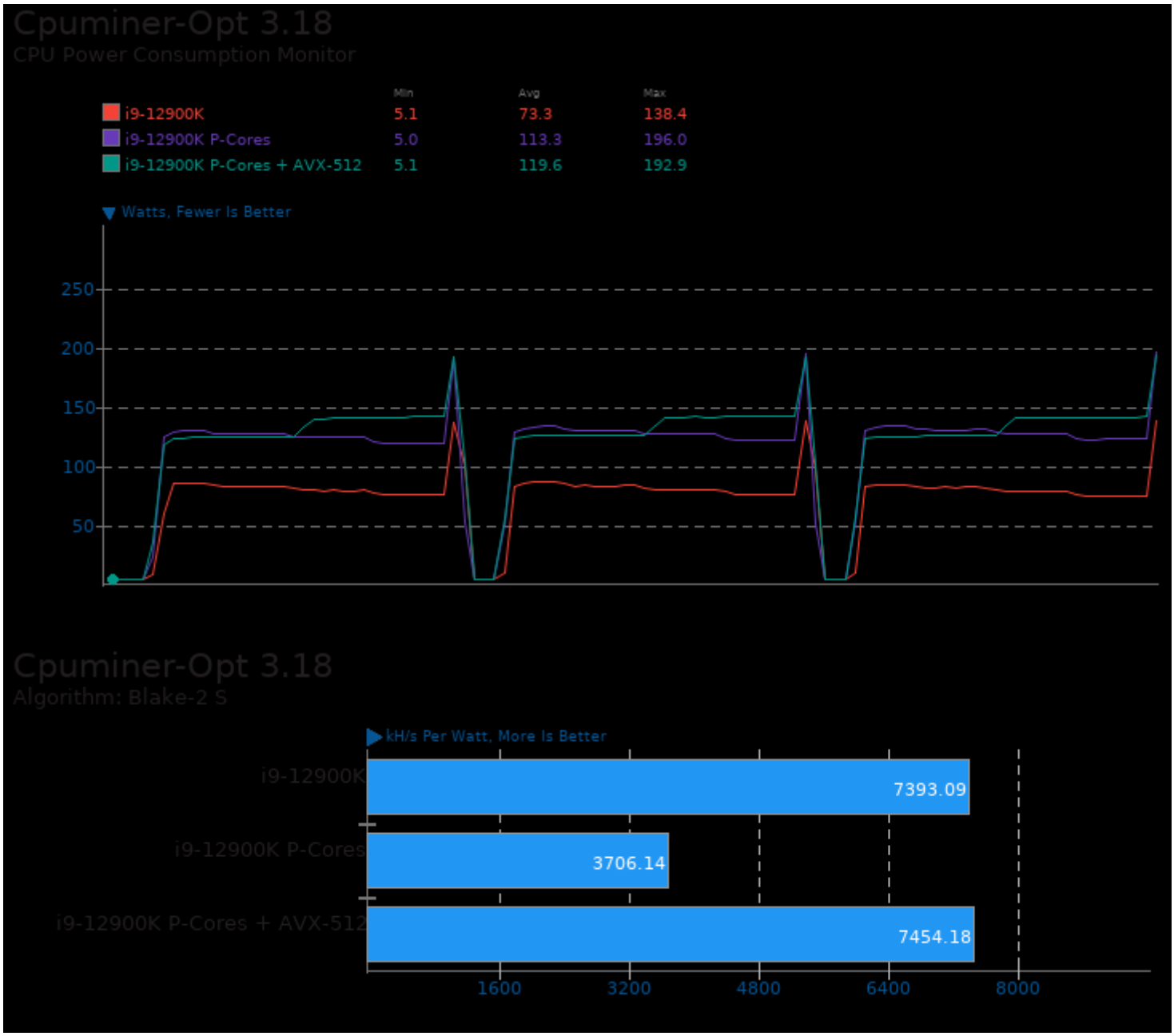
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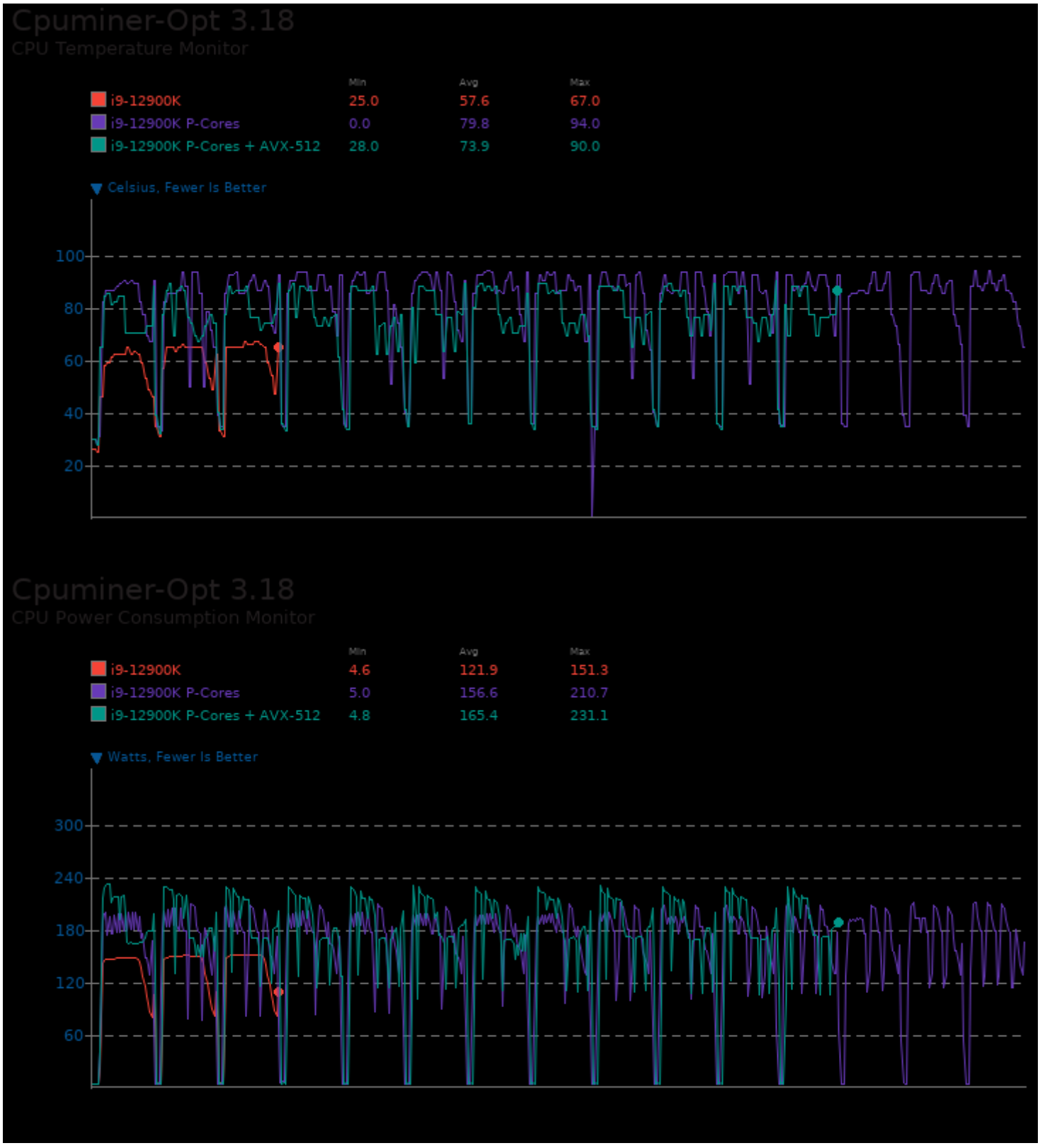


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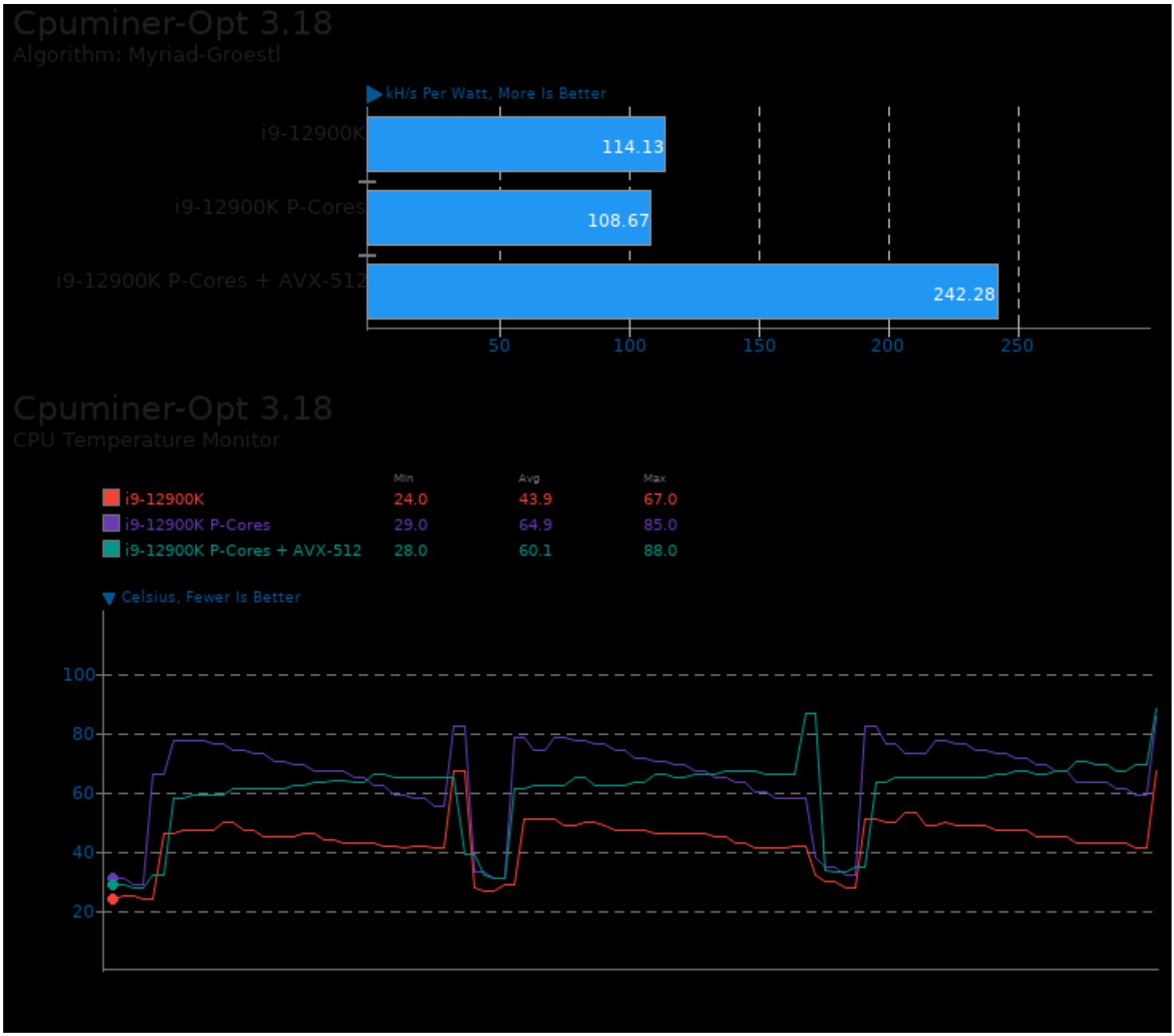


# Core i9 12900K AVX-512 Alder Lake Benchmarks




Cpuminer-Opt 3.18
CPU Temperature Monitor
Min
Avg
Max
i9-12900K
25.0
57.6
67.0
i9-12900K P-Cores
0.0
79.8
94.0
i9-12900K P-Cores + AVX-512
28.0
73.9
90.0
Celsius, Fewer Is Better
100
80
60
40
20
Cpuminer-Opt 3.18
CPU Power Consumption Monitor
Min
Avg
Max
i9-12900K
4.6
121.9
151.3
i9-12900K P-Cores
5.0
156.6
210.7
i9-12900K P-Cores + AVX-512
4.8
165.4
231.1
Watts, Fewer Is Better
300
240
180
120
60

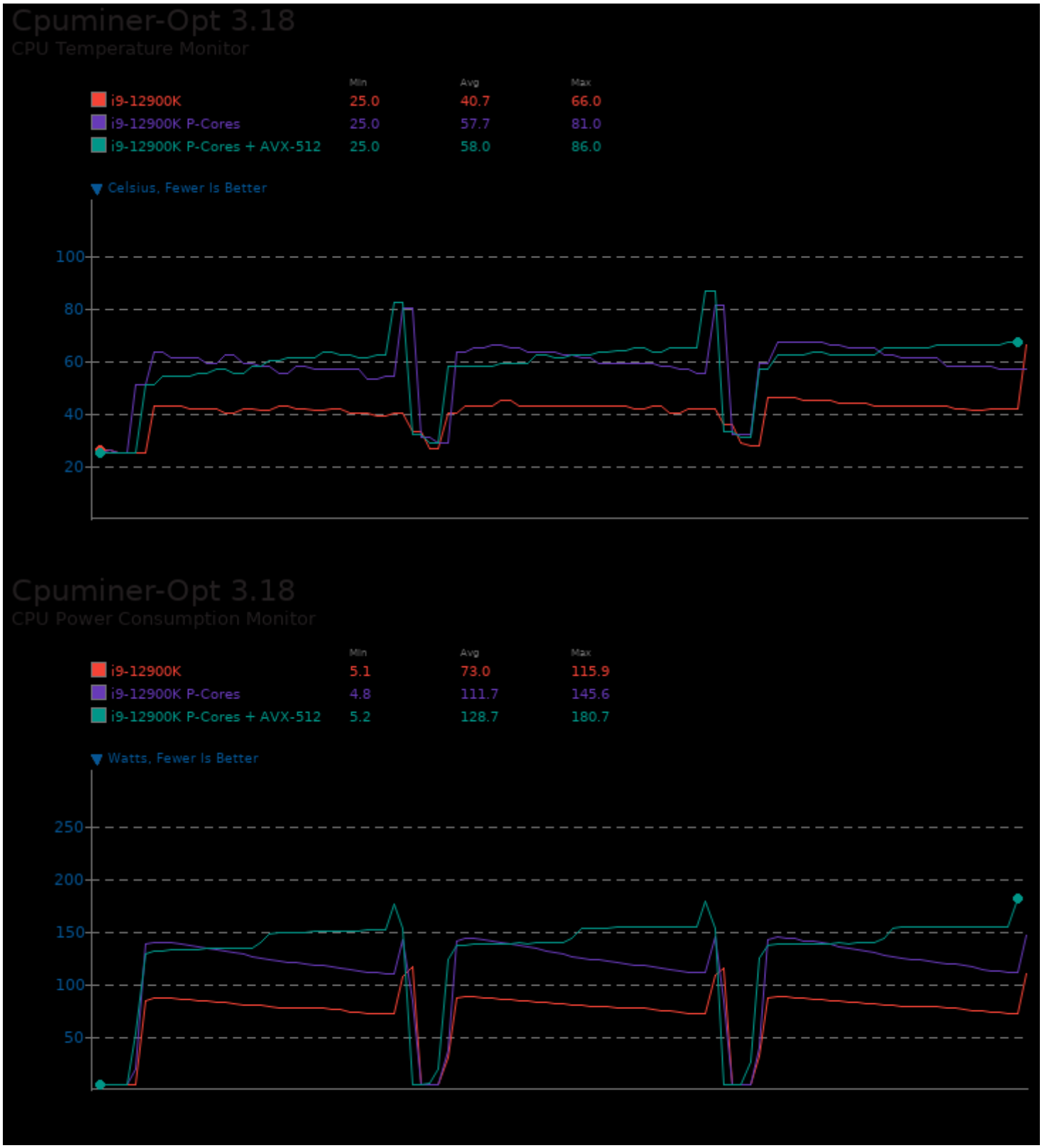
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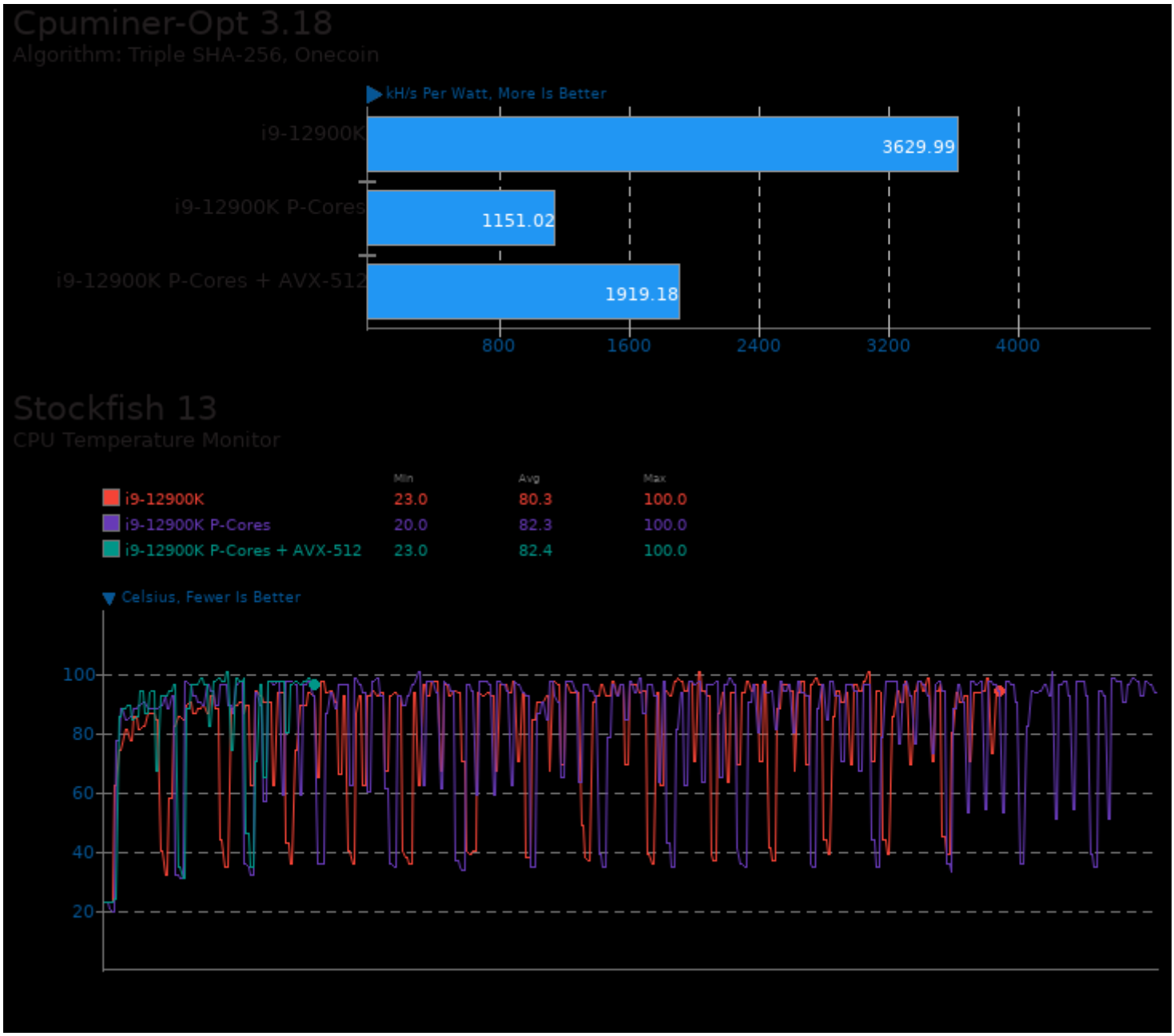
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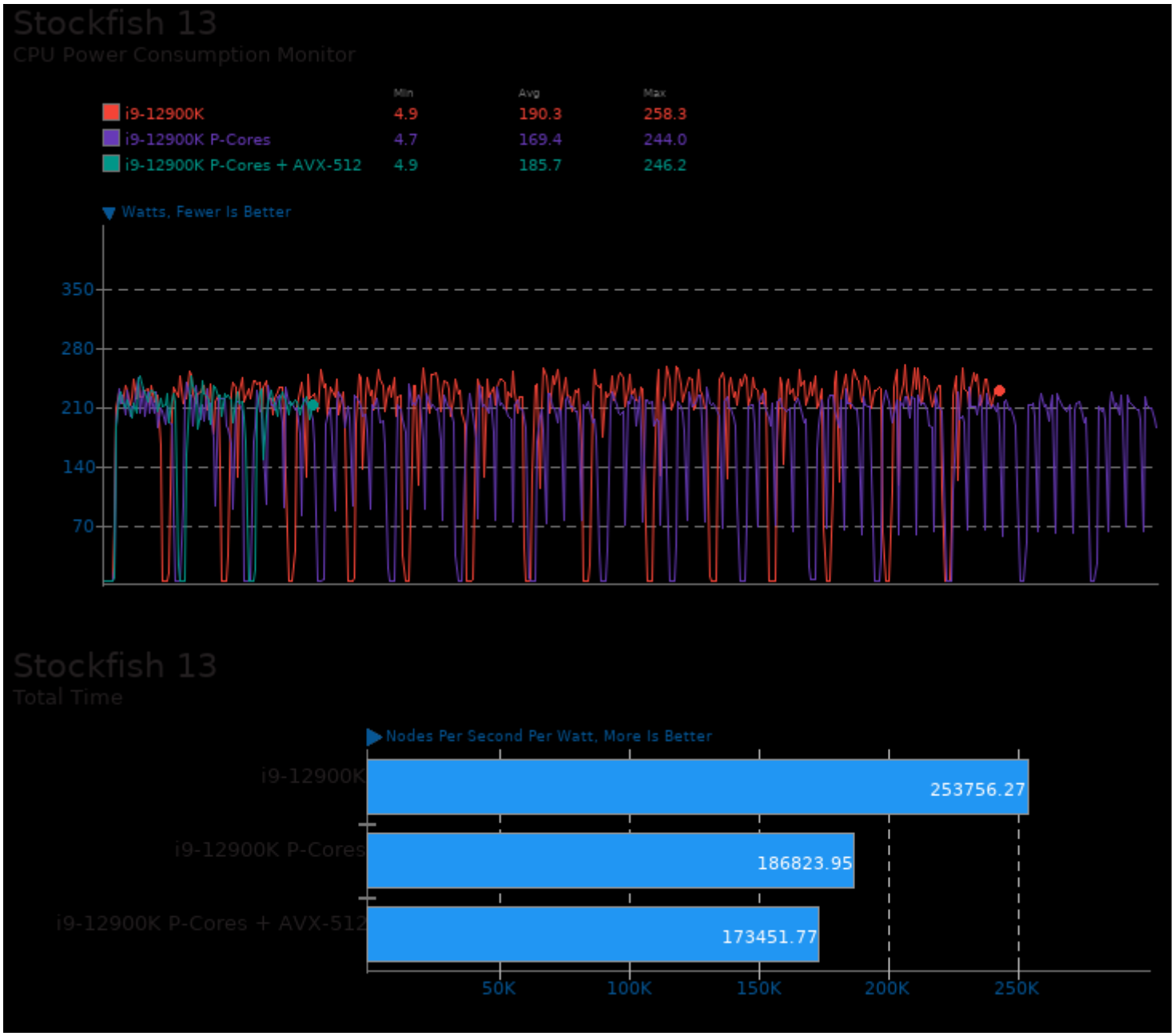
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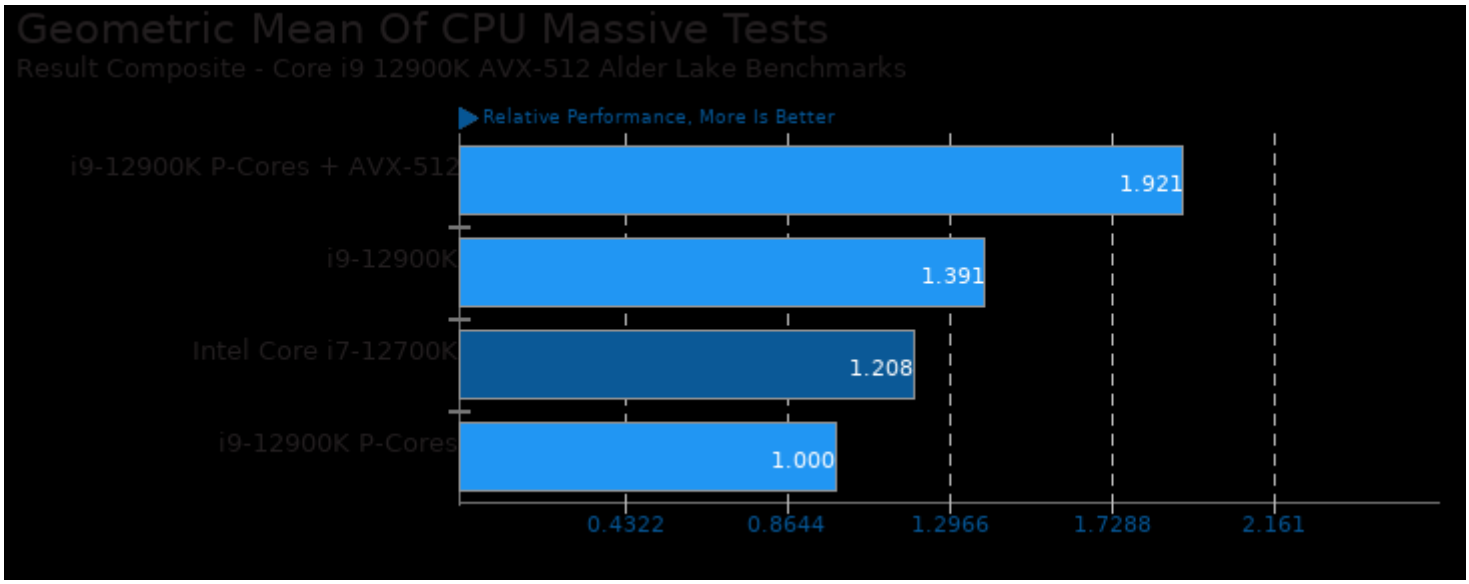


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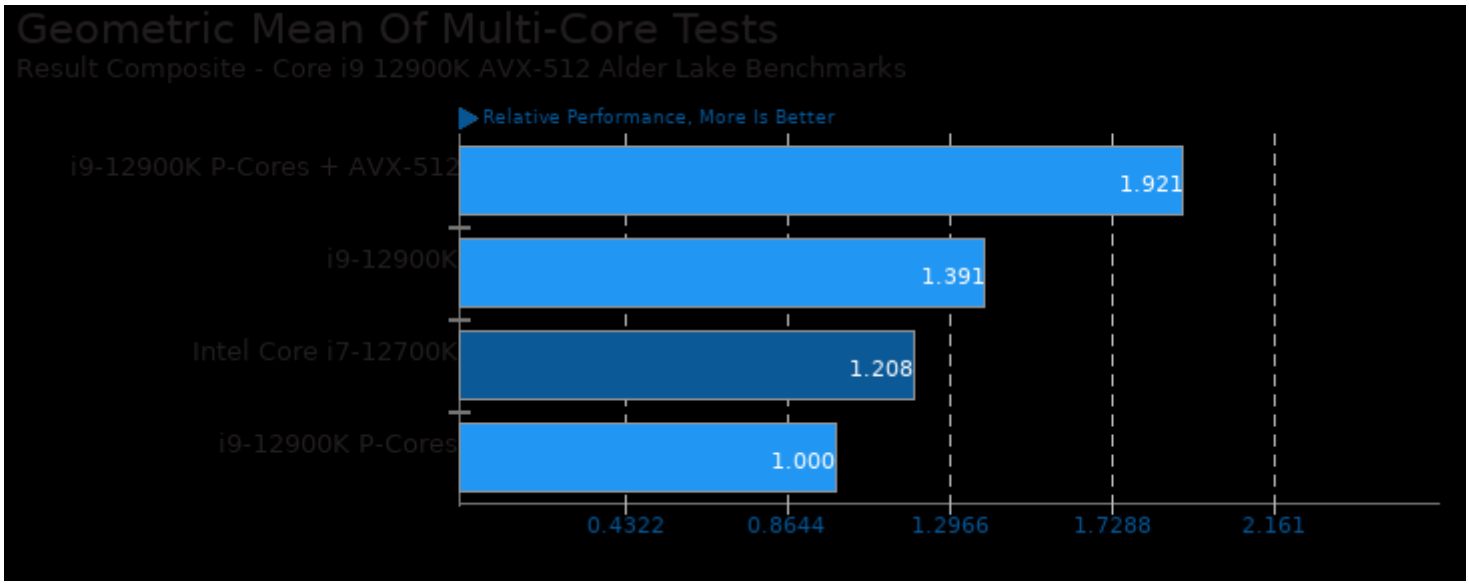


# Core i9 12900K AVX-512 Alder Lake Benchmarks

These geometric means are based upon test groupings / test suites for this result file.

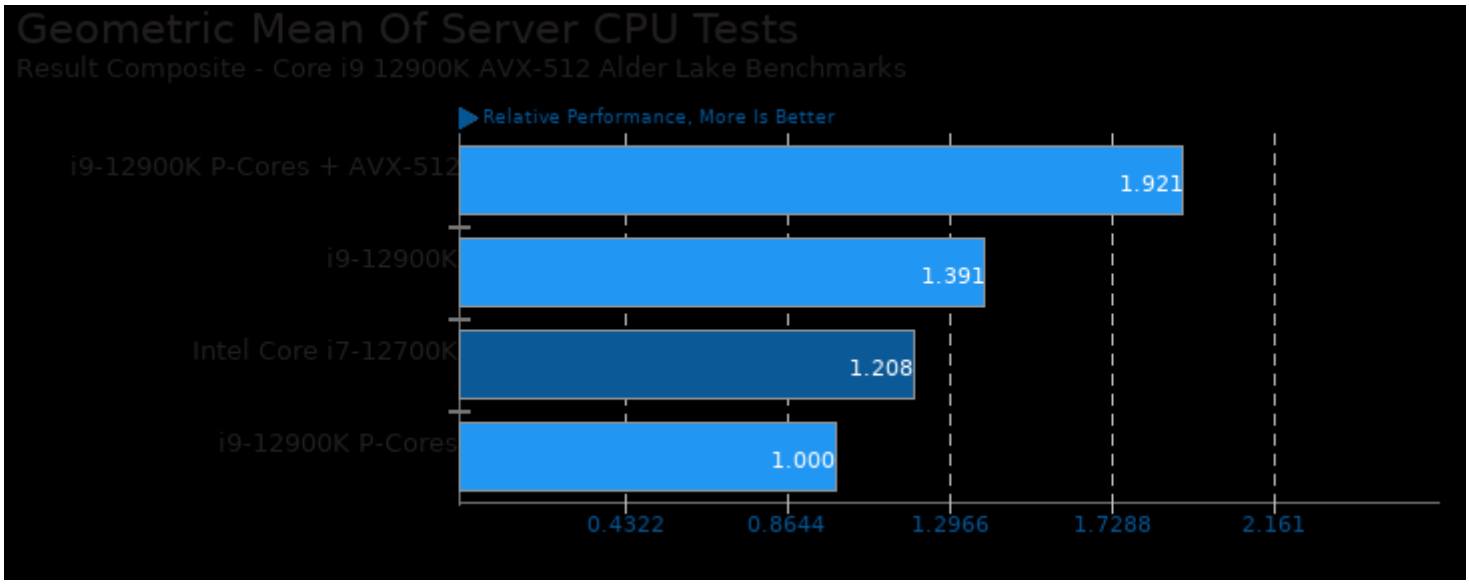



Geometric mean based upon tests: pts/stockfish and pts/cpuminer-opt




Geometric mean based upon tests: pts/cpuminer-opt and pts/stockfish

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Geometric mean based upon tests: pts/stockfish and pts/cpuminer-opt

*This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 15:52.*