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## DAV1D vs. GAV1 AV1 Decode Benchmarks

Ran on a Clevo P775TM1-R.

### Automated Executive Summary

*2 x EPYC 7742 had the most wins, coming in first place for 75% of the tests.*

*Based on the geometric mean of all complete results, the fastest (2 x EPYC 7742) was 7.191x the speed of the slowest (Core i7 5600U).*

### Test Systems:

#### 2 x EPYC 7742

Processor: 2 x AMD EPYC 7742 64-Core @ 2.25GHz (128 Cores / 256 Threads), Motherboard: AMD DAYTONA\_X (RDY1001C BIOS), Chipset: AMD Starship/Matisse, Memory: 516096MB, Disk: 280GB INTEL SSDPED1D280GA + 256GB Micron\_1100\_MTFD, Graphics: ASPEED, Monitor: VE228, Network: 2 x Mellanox MT27710

OS: Ubuntu 19.10, Kernel: 5.3.0-13-generic (x86\_64), Desktop: GNOME Shell 3.34.0, Display Server: X Server 1.20.5, Display Driver: modesetting 1.20.5, Compiler: GCC 9.2.1 20190909, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-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-offload-targets=nvptx-none,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: acpi-cpufreq ondemand

Security Notes: I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retrpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## 2 x Xeon Platinum 8280

Processor: 2 x Intel Xeon Platinum 8280 @ 4.00GHz (56 Cores / 112 Threads), Motherboard: GIGABYTE MD61-SC2-00 v01000100 (T15 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 386048MB, Disk: 280GB INTEL SSDPED1D280GA, Graphics: llvmpipe 377GB, Monitor: VE228, Network: 2 x Intel X722 for 1GbE + 2 x QLogic FastLinQ QL41000 10/25/40/50GbE

OS: Ubuntu 19.10, Kernel: 5.3.0-13-generic (x86\_64), Desktop: GNOME Shell 3.34.0, Display Server: X Server 1.20.5, Display Driver: modesetting 1.20.5, OpenGL: 3.3 Mesa 19.2.0 (LLVM 9.0 256 bits), Compiler: GCC 9.2.1 20190909, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-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-offload-targets=nvptx-none,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

Security Notes: I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling

## Core i5 9400F

Processor: Intel Core i5-9400F @ 4.10GHz (6 Cores), Motherboard: MSI B360M GAMING PLUS (MS-7B19) v1.0 (1.10 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16384MB, Disk: 256GB SAMSUNG MZVPW256HEGL-000H7, Graphics: MSI NVIDIA NV106 1GB, Audio: Realtek ALC887-VD, Monitor: VE228, Network: Intel I219-V

OS: Ubuntu 19.04, Kernel: 5.0.0-29-generic (x86\_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.3 Mesa 19.0.2, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,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

Security Notes: I1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT disabled + mds: Mitigation of Clear buffers; SMT disabled + meltdown: Mitigation of PTI + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retrpoline IBPB: conditional IBRS\_FW STIBP: disabled RSB filling

## Core i7 3770K

Processor: Intel Core i7-3770K @ 3.90GHz (4 Cores / 8 Threads), Motherboard: ECS Z77H2-A2X v1.0 (4.6.5 BIOS), Chipset: Intel Xeon E3-1200 v2/3rd, Memory: 8192MB, Disk: 160GB INTEL SSDSA2M160, Graphics: Intel Ivybridge Desktop 2GB (1150MHz), Audio: Realtek ALC892, Monitor: G237HL, Network: 2 x Realtek RTL8111/8168/8411

OS: Ubuntu 19.04, Kernel: 5.0.0-29-generic (x86\_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4,

Display Driver: modesetting 1.20.4, OpenGL: 4.2 Mesa 19.0.2, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-gnu --enable-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## Core i7 5600U

Processor: Intel Core i7-5600U @ 3.20GHz (2 Cores / 4 Threads), Motherboard: LENOVO 20BSCTO1WW (N14ET49W 1.27 BIOS), Chipset: Intel Broadwell-U-OPI, Memory: 8192MB, Disk: 128GB SAMSUNG MZNT128, Graphics: Intel HD 5500 3GB (950MHz), Audio: Intel Broadwell-U Audio, Network: Intel I218-LM + Intel 7265

OS: Ubuntu 19.04, Kernel: 5.0.0-29-generic (x86\_64), Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.6 Mesa 19.3.0-devel (git-99cbec0 2019-09-19 disco-oibaf-ppa), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-gnu --enable-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## Core i7 8550U

Processor: Intel Core i7-8550U @ 4.00GHz (4 Cores / 8 Threads), Motherboard: Dell 0H0VG3 (1.10.0 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 8192MB, Disk: PM961 NVMe SAMSUNG 256GB, Graphics: Intel UHD 620 3GB (1150MHz), Audio: Realtek ALC3271, Network: Qualcomm Atheros QCA6174 802.11ac

OS: Ubuntu 18.04, Kernel: 5.3.0-999-generic (x86\_64) 20190913, Desktop: GNOME Shell 3.28.4, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.6 Mesa 19.3.0-devel (git-ac175fb 2019-09-14 bionic-oibaf-ppa), Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-gnu --enable-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## Core i9 7980XE

Processor: Intel Core i9-7980XE @ 4.20GHz (18 Cores / 36 Threads), Motherboard: ASUS PRIME X299-A (1704 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 16384MB, Disk: Samsung SSD 970 EVO 500GB + 64GB Flash Drive, Graphics: NVIDIA GeForce GTX TITAN X 12GB, Audio: Realtek ALC1220, Monitor: ASUS PB278, Network: Intel I219-V

OS: Ubuntu 19.10, Kernel: 5.3.0-13-generic (x86\_64), Desktop: GNOME Shell 3.34.0, Display Server: X Server 1.20.5,

Display Driver: modesetting 1.20.5, OpenGL: 4.3 Mesa 19.2.0, Compiler: GCC 9.2.1 20190909, File-System: ext4, Screen Resolution: 2560x1440

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-offload-targets=nvptx-none,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 --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: I1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

### Core i9 9900K

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: ASUS PRIME Z390-A (1302 BIOS), Chipset: Intel Cannon Lake PCH, Memory: 16384MB, Disk: Samsung SSD 970 EVO 250GB + 2000GB SABRENT, Graphics: AMD Radeon RX 64 8GB (1590/800MHz), Audio: Realtek ALC1220, Monitor: Acer B286HK, Network: Intel I219-V

OS: Ubuntu 19.04, Kernel: 5.4.0-999-generic (x86\_64) 20191003, Desktop: GNOME Shell 3.32.2, Display Server: X Server 1.20.4, Display Driver: amdgpu 19.0.1, OpenGL: 4.5 Mesa 19.3.0-devel (git-1481d05 2019-10-04 disco-oibaf-ppa) (LLVM 9.0.0), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v

Processor Notes: Scaling Governor: intel\_pstate performance

Security Notes: I1tf: Not affected + mds: Mitigation of Clear buffers; SMT vulnerable + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

### Ryzen 5 3600X

Processor: AMD Ryzen 5 3600X 6-Core (6 Cores / 12 Threads), Motherboard: MSI X470 GAMING M7 AC (MS-7B77) v1.0 (1.B2 BIOS), Chipset: AMD Starship/Matisse, Memory: 16384MB, Disk: 256GB INTEL SSDPEKKW256G7, Graphics: MSI AMD Radeon R7 370 / R9 270/370 OEM 4GB, Audio: AMD Cape Verde/Pitcairn, Monitor: G237HL, Network: Qualcomm Atheros Killer E2500 + Intel 8265 / 8275

OS: Ubuntu 18.04, Kernel: 5.0.0-29-generic (x86\_64), Desktop: GNOME Shell 3.28.4, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.5 Mesa 19.0.8 (LLVM 8.0.0), Compiler: GCC 7.4.0, File-System: ext4, Screen Resolution: 1920x1080

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v

Security Notes: I1tf: 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 Full AMD retpoline IBPB: conditional STIBP: always-on RSB filling

### Ryzen 9 3900X

Processor: AMD Ryzen 9 3900X 12-Core @ 3.80GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (WI-FI) (1001 BIOS), Chipset: AMD Starship/Matisse, Memory: 16384MB, Disk: 280GB INTEL SSDPE21D280GA, Graphics: AMD Radeon RX 56/64 8GB (1630/945MHz), Audio: AMD Vega 10 HDMI Audio, Monitor: ASUS VP28U, Network: Realtek Device 8125 + Intel I211 + Intel Wi-Fi 6 AX200

OS: Ubuntu 19.10, Kernel: 5.3.0-13-generic (x86\_64), Desktop: GNOME Shell 3.34.0, Display Server: X Server 1.20.5, Display Driver: amdgpu 19.0.1, OpenGL: 4.5 Mesa 19.2.0 (LLVM 9.0.0), Compiler: GCC 9.2.1 20190909, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-multilib --enable-nls --enable-offload-targets=nvptx-none,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: acpi-cpufreq ondemand

Security Notes: I1tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Vulnerable + spectre\_v1: Vulnerable: \_\_user pointer sanitization and usercopy barriers only; no swapgs barriers + spectre\_v2: Vulnerable IBPB: disabled STIBP: disabled

### Threadripper 2990WX

Processor: AMD Ryzen Threadripper 2990WX 32-Core @ 3.00GHz (32 Cores / 64 Threads), Motherboard: ASUS ROG ZENITH EXTREME (1701 BIOS), Chipset: AMD 17h, Memory: 32768MB, Disk: Samsung SSD 970 EVO 500GB, Graphics: Sapphire AMD Radeon RX 470/480/570/570X/580/580X 8GB (1560/2100MHz), Audio: Realtek ALC1220, Monitor: ASUS VP28U, Network: Intel I211 + Qualcomm Atheros QCA6174 802.11ac + Wilocity WiL6200 802.11ad

OS: Ubuntu 19.04, Kernel: 5.1.0-bcachefs (x86\_64), Desktop: GNOME Shell 3.32.0, Display Server: X Server 1.20.4, Display Driver: modesetting 1.20.4, OpenGL: 4.5 Mesa 19.0.2 (LLVM 8.0.0), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 3840x2160

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multilib --enable-nls --enable-offload-targets=nvptx-none,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 --with-tune=generic --without-cuda-driver -v  
Processor Notes: Scaling Governor: acpi-cpufreq ondemand

Security Notes: I1tf: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of \_\_user pointer sanitization + spectre\_v2: Mitigation of Full AMD retrpoline IBPB: conditional STIBP: disabled RSB filling

### Xeon E3-1275 v6

Processor: Intel Xeon E3-1275 v6 @ 4.20GHz (4 Cores / 8 Threads), Motherboard: ASUS P10S-M WS (4401 BIOS), Chipset: Intel Xeon E3-1200 v6/7th, Memory: 16384MB, Disk: Samsung SSD 970 EVO Plus 500GB, Graphics: Intel HD P630 3GB (1150MHz), Audio: Realtek ALC1150, Monitor: VA2431, Network: 2 x Intel I210

OS: Ubuntu 19.10, Kernel: 5.3.0-13-generic (x86\_64), Desktop: GNOME Shell 3.34.0, Display Server: X Server 1.20.5, Display Driver: modesetting 1.20.5, OpenGL: 4.5 Mesa 19.2.0, Compiler: GCC 9.2.1 20190909, File-System: ext4, Screen Resolution: 1920x1080

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-multilib --enable-nls --enable-offload-targets=nvptx-none,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

Security Notes: I1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retrpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

### Xeon E5-2687W v3

Processor: Intel Xeon E5-2687W v3 @ 3.50GHz (10 Cores / 20 Threads), Motherboard: MSI X99S SLI PLUS (MS-7885) v1.0 (1.E0 BIOS), Chipset: Intel Xeon E7 v3/Xeon, Memory: 32768MB, Disk: 80GB INTEL SSDSCKGW08, Graphics: NVIDIA GeForce GTX 770 2GB, Audio: Realtek ALC892, Network: Intel I218-V

OS: Ubuntu 19.04, Kernel: 5.3.0-999-generic (x86\_64) 20190806, Desktop: GNOME Shell 3.32.2, Display Server: X

Server 1.20.4, Display Driver: modesetting 1.20.4, Compiler: GCC 8.3.0, File-System: ext4

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v  
Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## Core i9 9900k EVOC

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: EVOC P7xxTM1 powered by premamod (1.07.EVOC2 BIOS), Chipset: Intel 8th Gen Core 8-core Desktop, Memory: 64GB 12MB, Disk: 2 x 1000GB Samsung SSD 960 EVO 1TB + 2 x 400GB Samsung SSD 860, Graphics: NVIDIA GeForce RTX 2080 8GB (1380/7000MHz), Audio: Realtek ALC898, Network: Qualcomm Atheros Killer E2500 + Intel Wi-Fi 6 AX200

OS: Ubuntu 18.04, Kernel: 5.3.3 (x86\_64), Desktop: GNOME Shell 3.28.4, Display Server: X Server 1.19.6, Display Driver: NVIDIA 435.21, OpenGL: 4.6.0, OpenCL: OpenCL 1.2 CUDA 10.1.0, Compiler: GCC 7.4.0 + CUDA 10.1, File-System: ext4, Screen Resolution: 1920x1080

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --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 --with-tune=generic --without-cuda-driver -v  
Processor Notes: Scaling Governor: intel\_pstate powersave

Security Notes: l1tf: Not affected + mds: Mitigation of Clear buffers; SMT vulnerable + 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 Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling

## 9900K-50x50x47-4000C16

Processor: Intel Core i9-9900K @ 5.00GHz (8 Cores / 16 Threads), Motherboard: EVGA 121-KS-E375 v1.0 (1.09 BIOS), Chipset: Intel 8th Gen Core 8-core Desktop, Memory: 16GB 34MB, Disk: Samsung SSD 970 EVO 500GB + 120GB Samsung SSD 840 + 240GB KINGSTON SH103S3 + 2000GB Western Digital WD2003FZEX-0 + 120GB INTEL SSDSC2BW12, Graphics: ASUS NVIDIA GeForce GTX 1080 Ti 11GB, Audio: NVIDIA GP102 HDMI Audio, Monitor: XB271HU + LG ULTRAWIDE, Network: Intel I219-V

OS: Gentoo 2.6, Kernel: 5.2.9-ck (x86\_64), Desktop: KDE Plasma, Display Server: X Server 1.20.5, Compiler: GCC 9.2.0 + Clang 9.0.0 + LLVM 9.0.0 + CUDA 10.1, File-System: reiserfs

Compiler Notes: --bindir=/usr/x86\_64-pc-linux-gnu/gcc-bin/9.2.0 --build=x86\_64-pc-linux-gnu --datadir=/usr/share/gcc-data/x86\_64-pc-linux-gnu/9.2.0 --disable-alitvec --disable-esp --disable-fixed-point --disable-isl-version-check --disable-libmudflap --disable-libssp --disable-systemtap --disable-werror --enable\_cxa\_atexit --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-languages=c,c++,fortran --enable-libgomp --enable-libstdcxx-time --enable-lto --enable-multilib --enable-nls --enable-obsolete --enable-secureplt --enable-shared --enable-targets=all --enable-threads=posix --enable-vtable-verify --host=x86\_64-pc-linux-gnu --includedir=/usr/lib/gcc/x86\_64-pc-linux-gnu/9.2.0/include --mandir=/usr/share/gcc-data/x86\_64-pc-linux-gnu/9.2.0/man --with-isl --with-multilib-list=m32,m64 --with-python-dir=/share/gcc-data/x86\_64-pc-linux-gnu/9.2.0/python  
Processor Notes: Scaling Governor: intel\_pstate performance

Security Notes: l1tf: Not affected + mds: Vulnerable: Clear buffers attempted no microcode; SMT disabled + 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 Full generic retpoline IBPB: conditional IBRS\_FW RSB filling

## 9900K-54/4/3/3/3/2/2x0x49-3866C15

Processor: Intel Core i9-9900K @ 5.40GHz (8 Cores / 16 Threads), Motherboard: EVGA 121-KS-E375 v1.0 (1.16 BIOS), Chipset: Intel 8th/9th, Memory: 32GB, Disk: Samsung SSD 970 EVO 500GB + 240GB KINGSTON SH103S3 + 2000GB Samsung SSD 860 + 256GB PLEXTOR PX-256M6 + 2000GB Western Digital WD2003FZEX-0, Graphics: Gigabyte NVIDIA GeForce RTX 3080 10GB, Audio: NVIDIA GA102 HD Audio, Monitor: U34G2G4R3, Network: Intel

## DAV1D vs. GAV1 AV1 Decode Benchmarks

I219-V

OS: Gentoo 2.8, Kernel: 5.14.11-xanmod1 (x86\_64), Desktop: KDE Plasma, Display Server: X Server 1.20.13, Display Driver: NVIDIA, Vulkan: 1.2.186, Compiler: GCC 11.2.0 + Clang 13.0.0 + LLVM 13.0.0 + CUDA 11.4, File-System: reiserfs, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise

Environment Notes: \_\_GLX\_VENDOR\_LIBRARY\_NAME=nvidia

Compiler Notes: --bindir=/usr/x86\_64-pc-linux-gnu/gcc-bin/11.2.0 --build=x86\_64-pc-linux-gnu --datadir=/usr/share/gcc-data/x86\_64-pc-linux-gnu/11.2.0 --disable-esp --disable-fixed-point --disable-isl-version-check --disable-libada --disable-libssp --disable-libunwind-exceptions --disable-libvtv --disable-systemtap --disable-valgrind-annotations --disable-vtable-verify --disable-werror --enable-\_cxa\_atexit --enable-checking=release --enable-clocale-gnu --enable-default-pie --enable-default-ssp --enable-languages=c,c++,fortran --enable-libgomp --enable-libstdcxx-time --enable-lto --enable-multilib --enable-nls --enable-obsolete --enable-secureplt --enable-shared --enable-targets=all --enable-threads=posix --host=x86\_64-pc-linux-gnu --includedir=/usr/lib/gcc/x86\_64-pc-linux-gnu/11.2.0/include --mandir=/usr/share/gcc-data/x86\_64-pc-linux-gnu/11.2.0/man --with-build-config=bootstrap-lto --with-isl --with-multilib-list=m32,m64 --with-python-dir=/share/gcc-data/x86\_64-pc-linux-gnu/11.2.0/python --without-zstd

Processor Notes: Scaling Governor: intel\_pstate performance - CPU Microcode: 0x98

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + I1f: Not affected + mds: Vulnerable: Clear buffers attempted no microcode; SMT vulnerable + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbs: Vulnerable: No microcode + tsx\_async\_abort: Vulnerable: Clear buffers attempted no microcode; SMT vulnerable

	2 x	2 x	Core	Core	Core	Core	Core	Core	Ryze	Ryze	Threa	Xeon	Xeon	Core	9900	9900
	EPYC	Xeon	i5	i7	i7	i7	i9	i9	n 5	n 9	dripp	E3-12	E5-26	i9	K-50x	K-54/
	7742	Platin	9400	3770	5600	8550	7980	9900	3600	3900	er	75 v6	87W	9900k	50x47	4/3/3/
	um	F	K	U	U	XE	K	X	X	2990		v3	EVOC	-4000	3/3/2/	
	8280										WX			C16	2x0x4	9-386
																6C15
<b>dav1d -</b>	714	333	295	143	115	215	281	553	400	483	431	291	369	533	725.2	711.2
<b>Chimera</b>															2	9
<b>1080p (FPS)</b>																
Normalized	98.45%	45.92%	40.68%	19.72%	15.86%	29.65%	38.75%	76.25%	55.16%	66.6%	59.43%	40.13%	50.88%	73.49%	100%	98.08%
Standard	0.1%	1.5%	0.5%	0.1%	0.8%	3%	0.4%	1%	0.2%	0.1%	1.6%	0.1%	0.4%	0.4%	0.4%	0.4%
Deviation																
<b>libgav1 -</b>	34.67	25.13	48.37	31.31	17.46	28.92	30.30	75.70	51.43	53.10	39.18	44.08	37.22	67.30		
<b>Chimera</b>																
<b>1080p (FPS)</b>																
Normalized	45.8%	33.2%	63.9%	41.36%	23.06%	38.2%	40.03%	100%	67.94%	70.15%	51.76%	58.23%	49.17%	88.9%		
Standard	1.1%	0.4%	0.1%	0.1%	0%	0.3%	0.1%	0%	0%	0.1%	0.5%	0%	0.1%	0.2%		
Deviation																
<b>dav1d -</b>	119.4	63.37	60.91	39.42	22.31	40.06	47.74	78.79	74.58	70.22	72.45	52.13	43.76	80.39	86.45	88.02
<b>C.1.1.b (FPS)</b>	0															
Normalized	100%	53.07%	51.01%	33.02%	18.69%	33.55%	39.98%	65.99%	62.46%	58.81%	60.68%	43.66%	36.65%	67.33%	72.4%	73.72%
Standard	0.4%	1.1%	0.1%	0.1%	0.2%	1.1%	0.3%	0.3%	0.1%	0.1%	0.3%	0.2%	0.2%	0.3%	0.1%	0.2%
Deviation																
<b>libgav1 -</b>	14.73	12.18	19.77	13.70	9.29	13.94	13.73	27.53	19.07	21.20	15.19	19.47	14.79	25.02		
<b>C.1.1.b (FPS)</b>																
Normalized	53.51%	44.24%	71.81%	49.76%	33.75%	50.64%	49.87%	100%	69.27%	77.01%	55.18%	70.72%	53.72%	90.88%		
Standard	1.9%	0.1%	0.3%	0.2%	0.2%	0.1%	0.1%	0.1%	1%	0.7%	0.6%	0.1%	0.2%	0%		
Deviation																

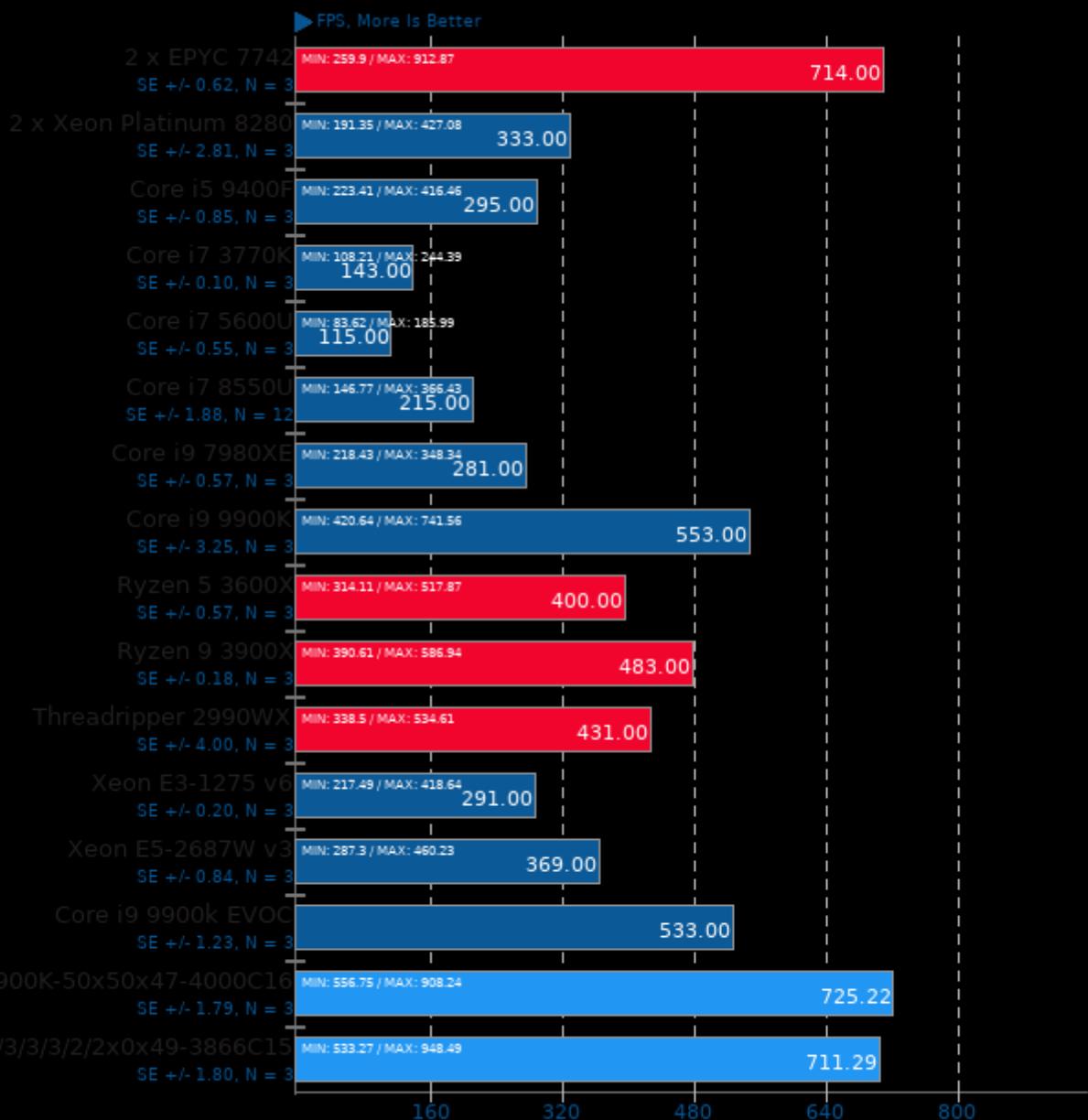
## DAV1D vs. GAV1 AV1 Decode Benchmarks

<b>dav1d - S.N.1</b>	<b>(FPS)</b>	<b>757</b>	385	291	147	<b>105</b>	206	293	515	384	470	469	273	324	481	589.0	606.5
Normalized	100%	50.86%	38.44%	19.42%	13.87%	27.21%	38.71%	68.03%	50.73%	62.09%	61.96%	36.06%	42.8%	63.54%	77.82%	80.12%	
Standard	1.4%	2.4%	0.1%	0.4%	0.3%	2.8%	0.6%	0.2%	0.5%	0.3%	0.3%	0.4%	0.3%	0.3%	0.2%	0.3%	
Deviation																	
<b>libgav1 - S.N.1 (FPS)</b>		<b>50.73</b>	35.79	81.70	49.36	<b>31.02</b>	49.39	47.24	<b>112.2</b>	86.13	82.02	58.58	71.03	55.30	99.60		
Normalized	45.2%	31.89%	72.8%	43.98%	27.64%	44.01%	42.09%	100%	76.74%	73.08%	52.2%	63.29%	49.27%	88.75%			
Standard	1.8%	0.7%	0.1%	0.3%	0.3%	0.8%	0.1%	0.1%	0.2%	0.1%	0.6%	0%	0.2%	0%			
Deviation																	
<b>dav1d - Summer</b>	<b>Nature 4K (FPS)</b>	<b>320.8</b>	197.5	87.08	38.27	<b>28.74</b>	53.82	164.4	144.8	120.0	172.8	177.5	81.35	122.9	146.0	191.9	190.3
Normalized	100%	61.58%	27.14%	11.93%	8.96%	16.77%	51.24%	45.16%	37.4%	53.87%	55.34%	25.36%	38.31%	45.51%	59.84%	59.34%	
Standard	2.1%	1.4%	0.1%	0%	0.1%	1.7%	0.9%	0.9%	0.1%	0.1%	1.6%	0.2%	0.1%	0.1%	0%	0.1%	
Deviation																	
<b>libgav1 - Summer</b>		<b>15.78</b>	12.21	19.13	11.96	<b>7.09</b>	11.41	14.71	<b>29.93</b>	22.66	24.73	17.80	17.13	18.38	26.99		
<b>Nature 4K</b>	<b>(FPS)</b>																
Normalized	52.72%	40.8%	63.92%	39.96%	23.69%	38.12%	49.15%	100%	75.71%	82.63%	59.47%	57.23%	61.41%	90.18%			
Standard	0.2%	0.7%	0.1%	0.2%	0.4%	0.2%	0.1%	0.1%	0%	0.4%	0.5%	0.1%	0%	0%			
Deviation																	

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### dav1d 0.4.0

Video Input: Chimera 1080p

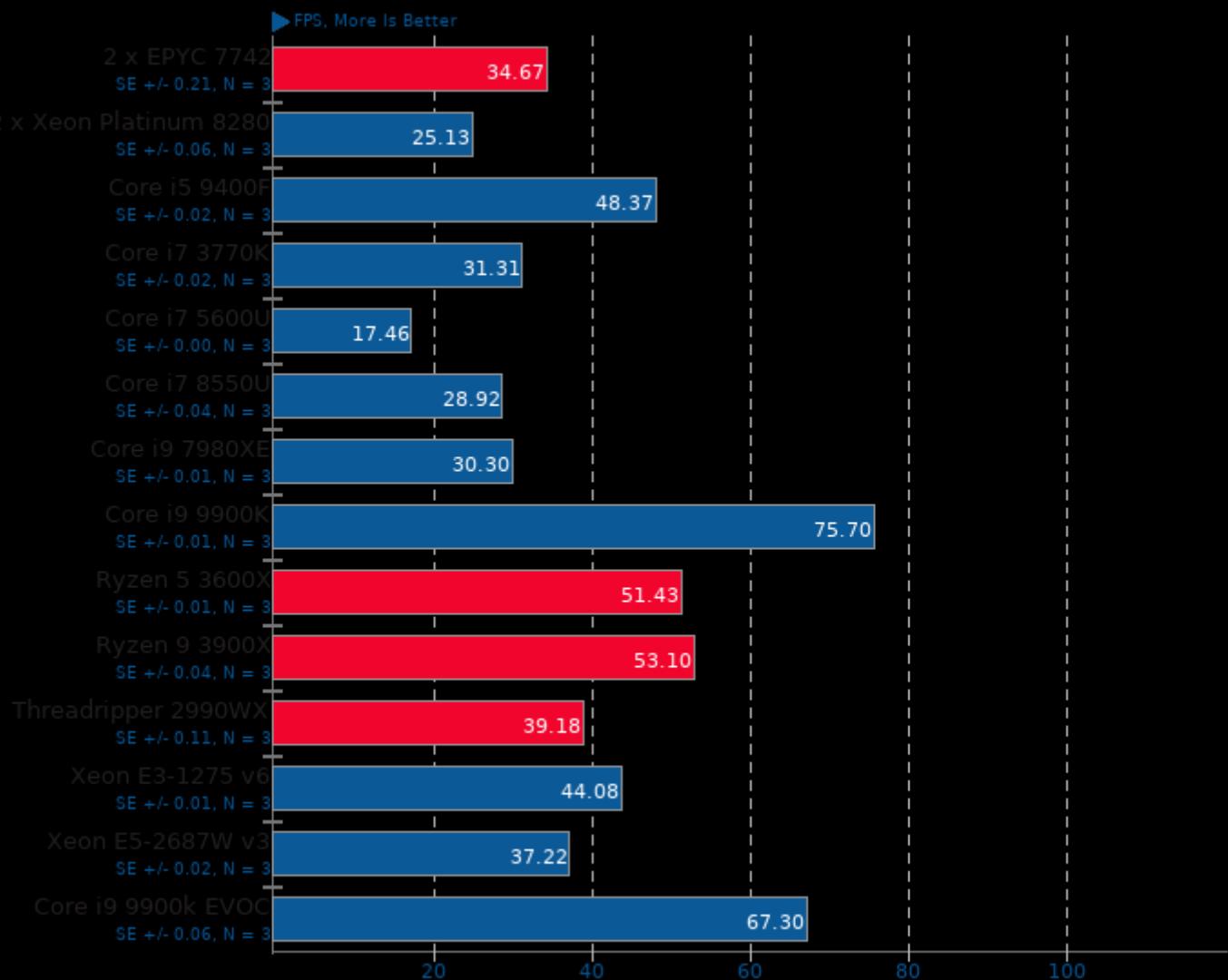


1. (CC) gcc options: -pthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### libgav1 2019-10-05

Video Input: Chimera 1080p

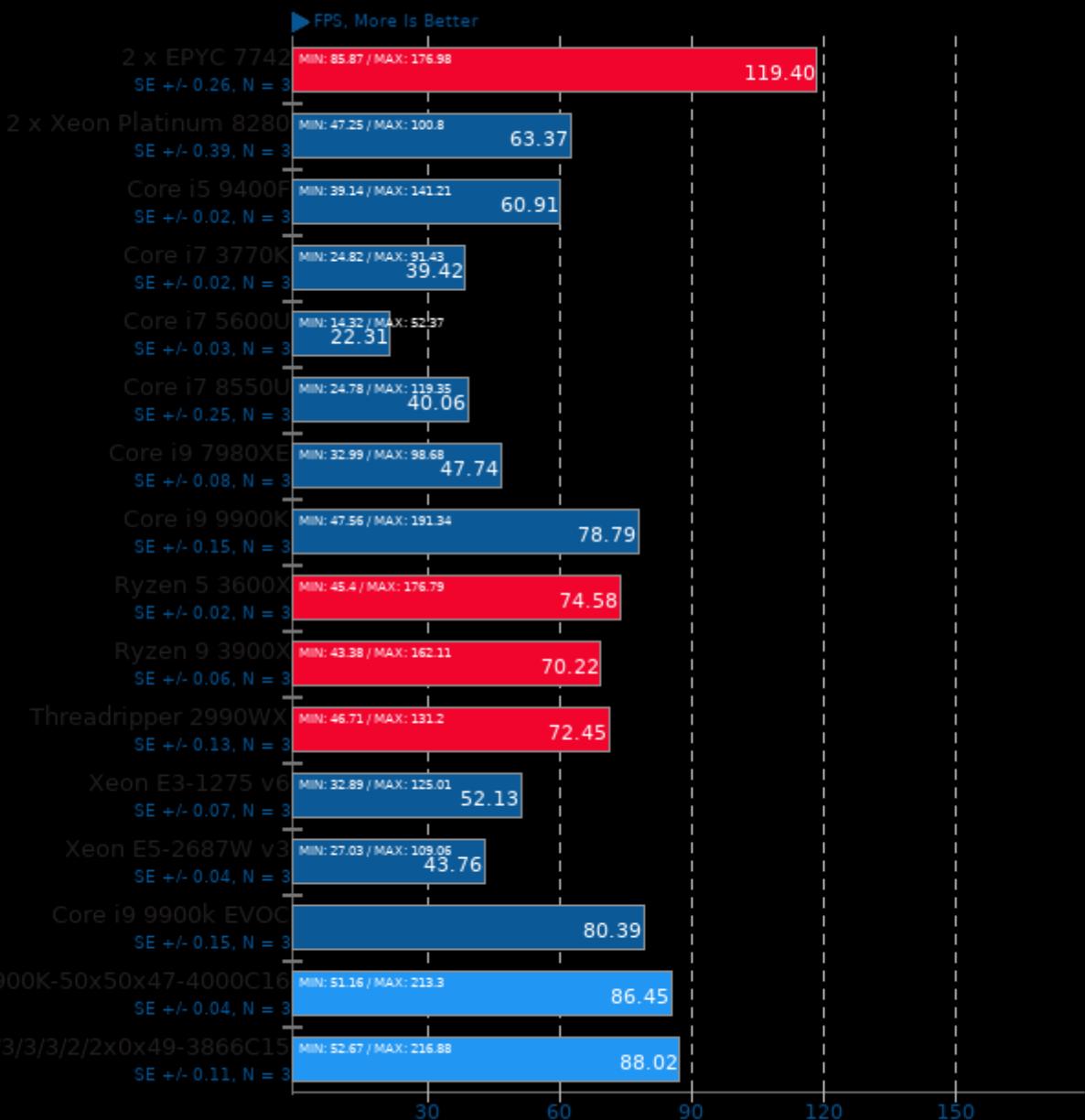


1. (CXX) g++ options: -O3 -lpthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### dav1d 0.4.0

Video Input: Chimera 1080p 10-bit

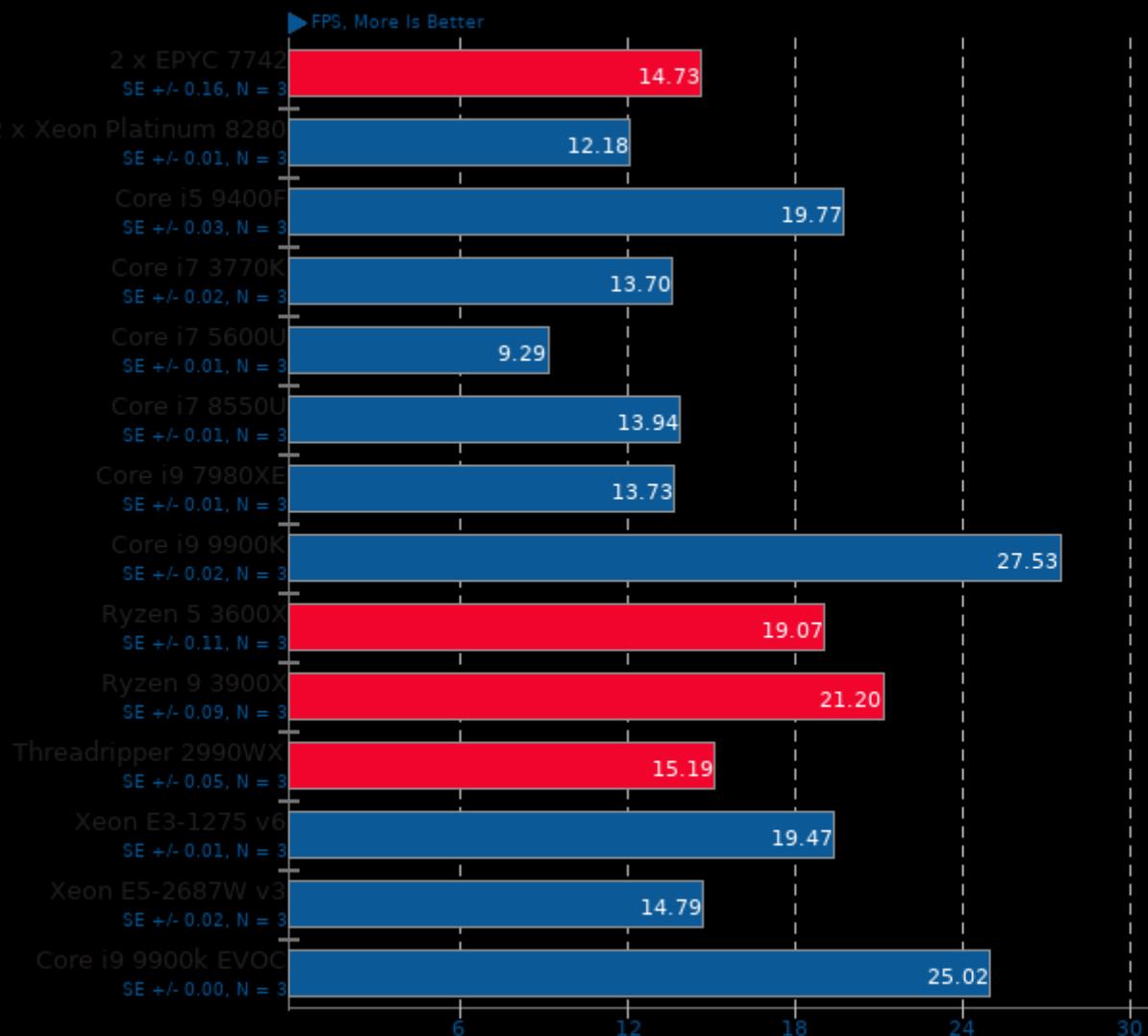


1. (CC) gcc options: -pthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### libgav1 2019-10-05

Video Input: Chimera 1080p 10-bit

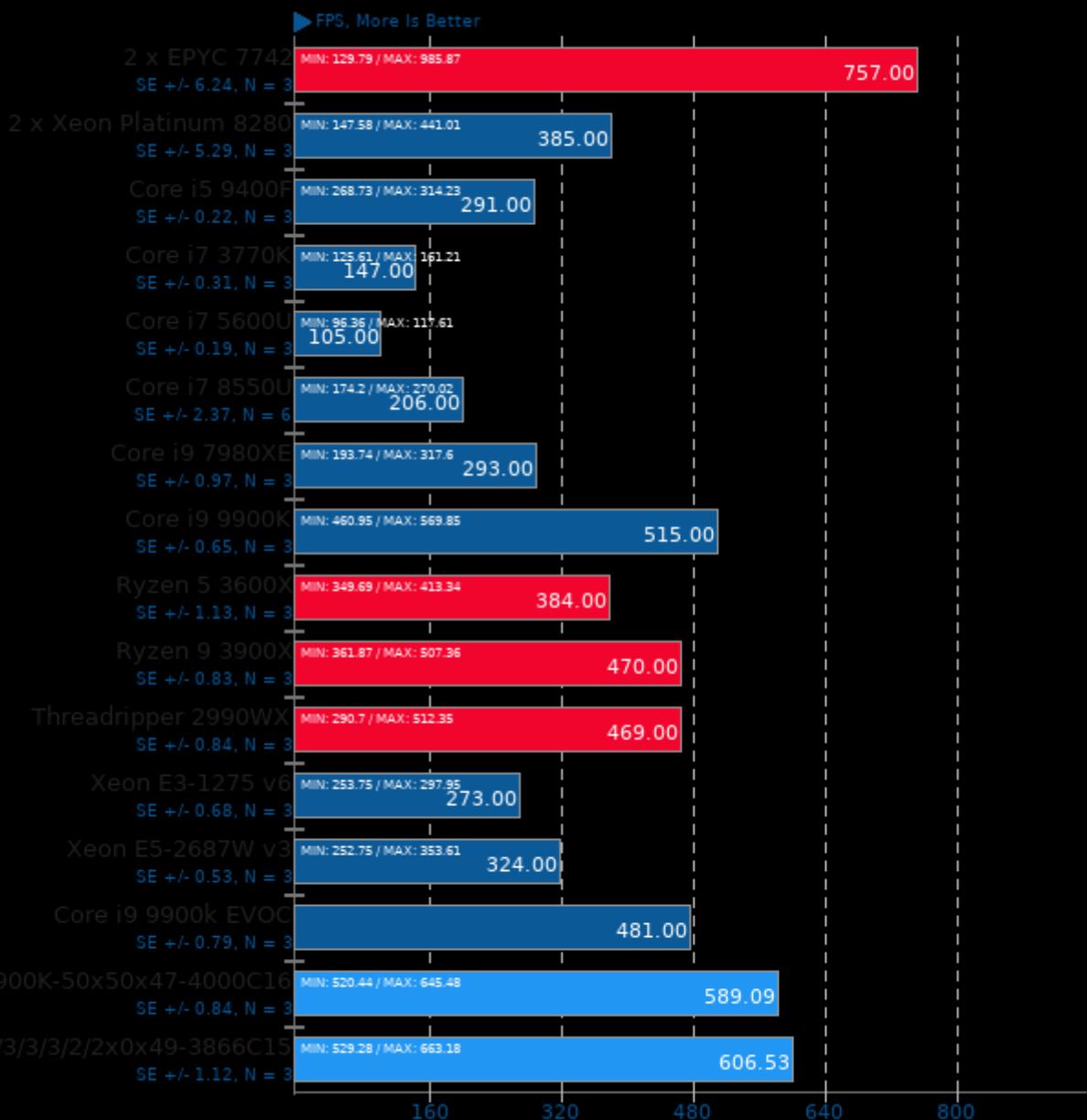


1. (CXX) g++ options: -O3 -fthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### dav1d 0.4.0

Video Input: Summer Nature 1080p

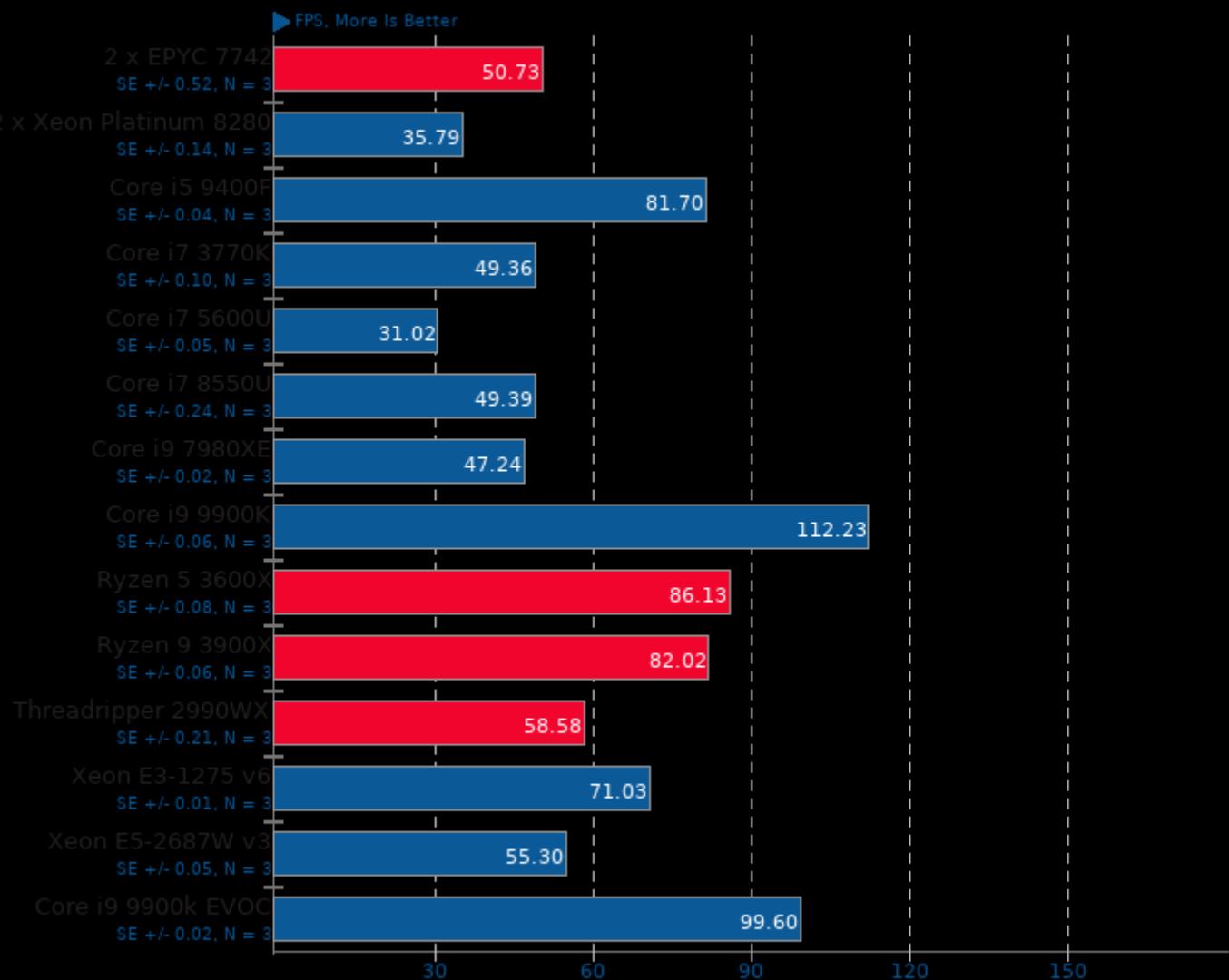


1. (CC) gcc options: -pthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### libgav1 2019-10-05

Video Input: Summer Nature 1080p

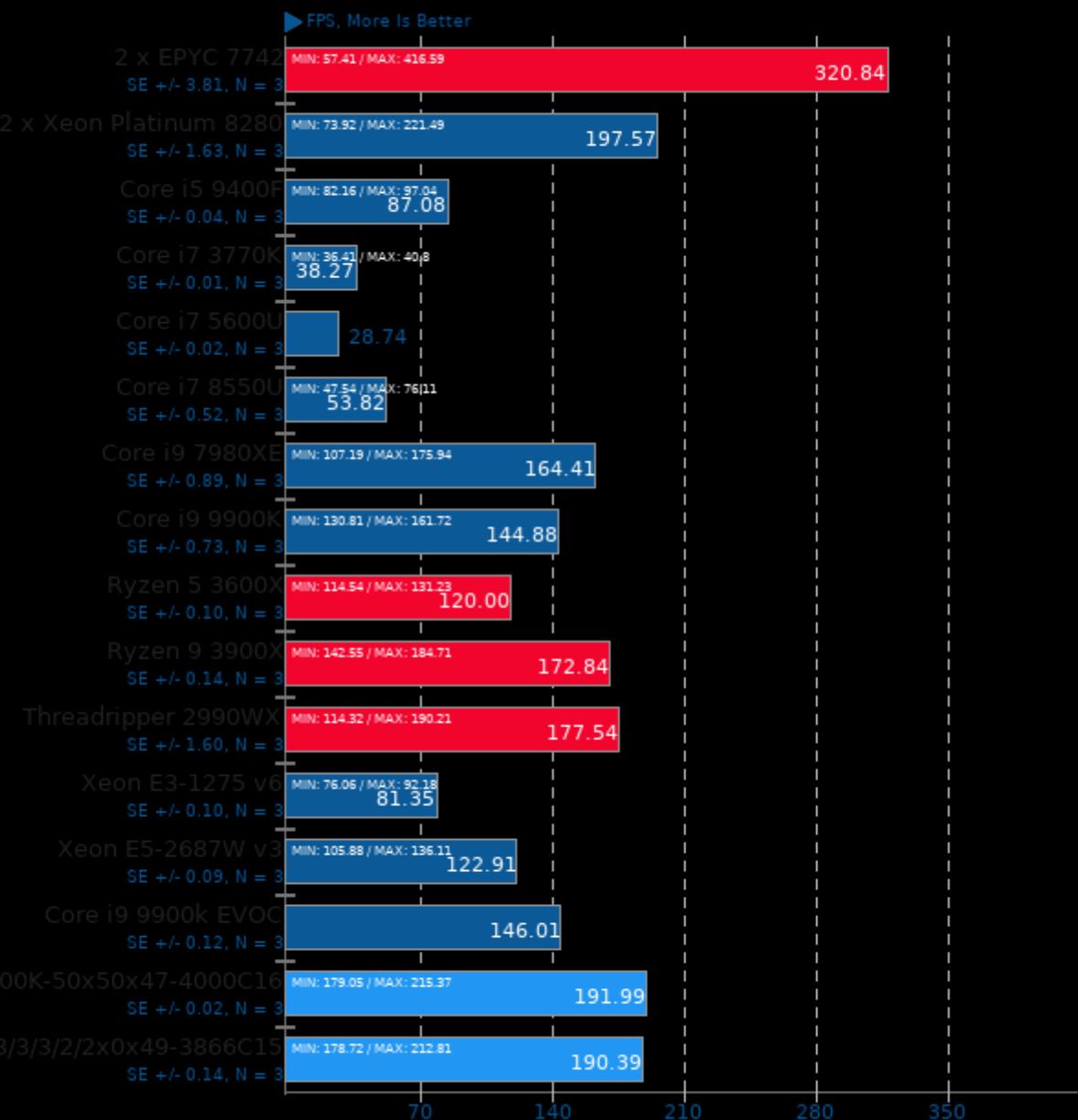


1. (CXX) g++ options: -O3 -lpthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

### dav1d 0.4.0

Video Input: Summer Nature 4K

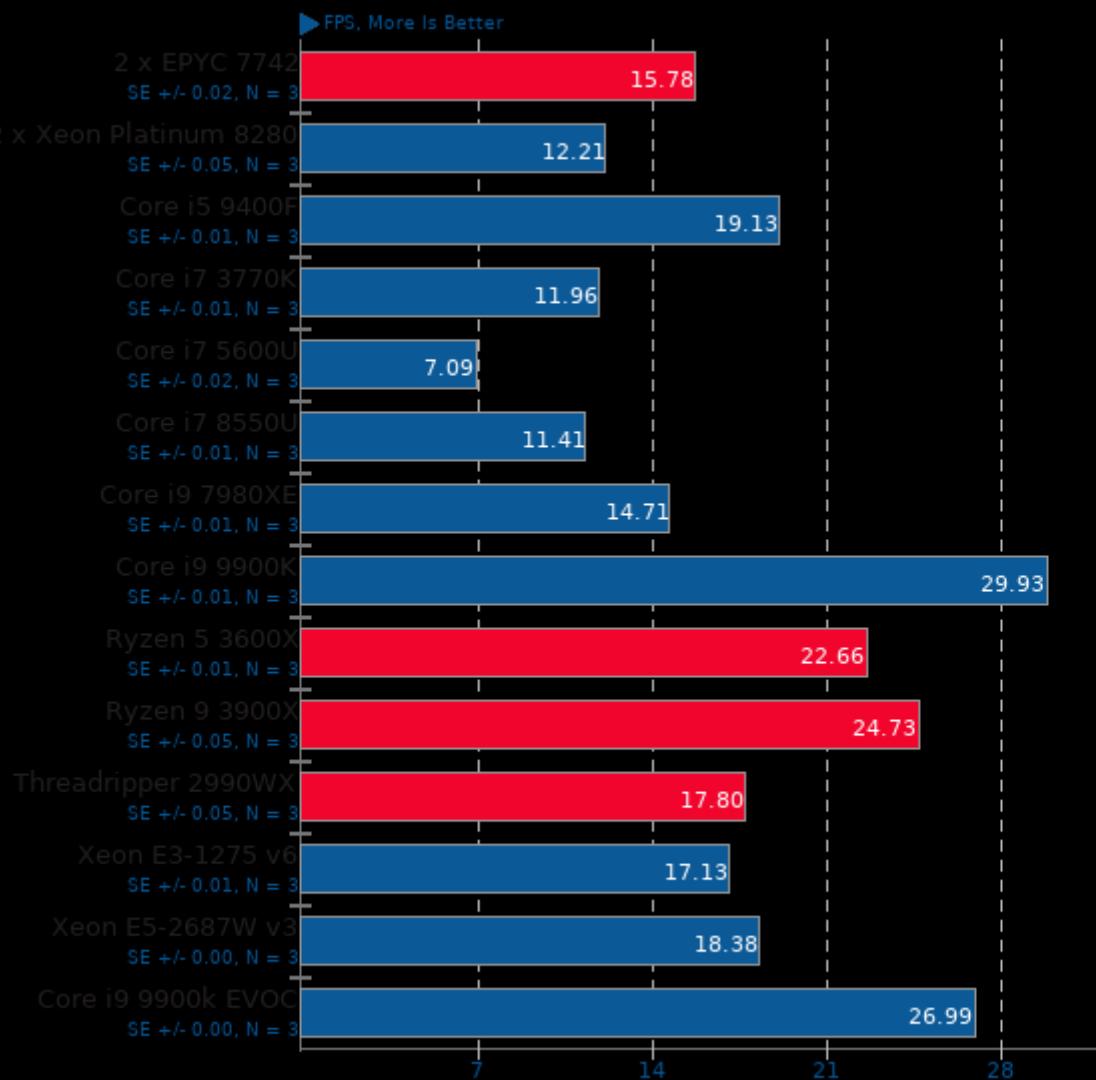


1. (CC) gcc options: -pthread

## DAV1D vs. GAV1 AV1 Decode Benchmarks

**libgav1 2019-10-05**

Video Input: Summer Nature 4K



1. (CXX) g++ options: -O3 -lpthread

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