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Tigerlake Xe Gen12 to Gen9

Tests for a future article

Test Systems:

Gen9 - i7-8565U

Processor: Intel Core i7-8565U @ 4.60GHz (4 Cores / 8 Threads), Motherboard: Dell 0KTW76 (1.0.0 BIOS), Chipset: Intel Cannon Point-LP, Memory: 16GB, Disk: SK hynix PC401 NVMe 256GB, Graphics: Intel UHD 620 3GB (1150MHz), Audio: Realtek ALC3271, Network: Qualcomm Atheros QCA6174 802.11ac

OS: Ubuntu 20.10, Kernel: 5.9.1-050901-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, OpenGL: 4.6 Mesa 20.3.0-devel (git-fdbc45d 2020-10-21 groovy-oibaf-ppa), OpenCL: OpenCL 3.0, Vulkan: 1.2.145, Compiler: GCC 10.2.0, 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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/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: 0xd6 - Thermald 2.3
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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 + srbds: Mitigation of Microcode + tsx_async_abort: Not affected

Gen11 - i7-1065G7

Processor: Intel Core i7-1065G7 @ 3.90GHz (4 Cores / 8 Threads), Motherboard: Dell 06CDVY (1.0.9 BIOS), Chipset: Intel Device 34ef, Memory: 16GB, Disk: KBG40ZPZ512G NVMe TOSHIBA 512GB, Graphics: Intel Iris Plus G7 3GB (1100MHz), Audio: Realtek ALC289, Network: Intel Killer Wi-Fi 6 AX1650i 160MHz

OS: Ubuntu 20.10, Kernel: 5.9.1-050901-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, OpenGL: 4.6 Mesa 20.3.0-devel (git-4408131 2020-10-20 groovy-oibaf-ppa), OpenCL: OpenCL 3.0, Vulkan: 1.2.145, Compiler: GCC 10.2.0, File-System: ext4, Screen Resolution: 1920x1200

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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/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: 0x78 - Thermald 2.3
Python Notes: Python 3.8.6
Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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

Gen12 Xe - i7-1165G7

Processor: Intel Core i7-1165G7 @ 4.70GHz (4 Cores / 8 Threads), Motherboard: Dell 0GG9PT (1.0.3 BIOS), Chipset: Intel Tiger Lake-LP, Memory: 16GB, Disk: KIOXIA KBG40ZNS256G NVMe 256GB, Graphics: Intel UHD 3GB (1300MHz), Audio: Realtek ALC289, Network: Intel Wi-Fi 6 AX201

OS: Ubuntu 20.10, Kernel: 5.9.1-050901-generic (x86_64), Desktop: GNOME Shell 3.38.1, Display Server: X Server 1.20.9, Display Driver: modesetting 1.20.9, OpenGL: 4.6 Mesa 20.3.0-devel (git-fdbc45d 2020-10-21 groovy-oibaf-ppa), OpenCL: OpenCL 3.0, Vulkan: 1.2.145, Compiler: GCC 10.2.0, File-System: ext4, Screen Resolution: 1920x1200

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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/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: 0x60 - Thermald 2.3
Python Notes: Python 3.8.6
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

	Gen9 - i7-8565U	Gen11 - i7-1065G7	Gen12 Xe - i7-1165G7
oneAPI Level Zero Tests - P.I.C (GFLOPS)	138.516	153.147	439.002
Normalized	31.55%	34.89%	100%
Standard Deviation	3%	2.4%	0.5%

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oneAPI Level Zero Tests - D.T.H.B (GB/s)	**13.462183**	21.943939	**26.690187**
Normalized	50.44%	82.22%	100%
Standard Deviation	1%	0.1%	0.2%
oneAPI Level Zero Tests - D.T.H.B (usec)	**19941**	12233	**10057**
Normalized	50.44%	82.22%	100%
Standard Deviation	1%	0.1%	0.2%
oneAPI Level Zero Tests - H.T.D.B (GB/s)	**13.592119**	21.928612	**26.714162**
Normalized	50.88%	82.09%	100%
Standard Deviation	0.9%	0.2%	0.3%
oneAPI Level Zero Tests - H.T.D.B (usec)	**19750**	12241	**10049**
Normalized	50.88%	82.09%	100%
Standard Deviation	0.9%	0.2%	0.3%
oneAPI Level Zero Tests - P.K.L.L (us)	**31.4224**	28.9568	**22.3130**
Normalized	71.01%	77.06%	100%
Standard Deviation	1.6%	11%	9.6%
oneAPI Level Zero Tests - P.H.P.C (GFLOPS)	**751.623**	1352	**3037**
Normalized	24.75%	44.53%	100%
Standard Deviation	0.1%	2.5%	0.1%
oneAPI Level Zero Tests - P.S.P.C (GB/s)	**418.862**	920.207	**1220**
Normalized	34.35%	75.46%	100%
Standard Deviation	0.7%	0%	0%
oneAPI Level Zero Tests - H.T.D.T.H.I.C	**4.83779**	10.5736	**21.6345**
Normalized	22.36%	48.87%	100%
Standard Deviation	0.6%	2.9%	0.9%
oneAPI Level Zero Tests - P.F.G.M.B (GB/s)	**24.5276**	34.7522	**56.9391**
Normalized	43.08%	61.03%	100%
Standard Deviation	2.1%	0.1%	0.5%
oneAPI Level Zero Tests - P.S.M.C.t.S.M	**10.7883**	13.8085	**15.0859**
Normalized	71.51%	91.53%	100%
Standard Deviation	2.9%	0.3%	0.5%
RealSR-NCNN - 4x - No (sec)	**202.601**	143.988	**68.311**
Normalized	33.72%	47.44%	100%
Standard Deviation	0.5%	0.4%	1.1%
RealSR-NCNN - 4x - Yes (sec)	**1615**	1120	**538.065**
Normalized	33.32%	48.04%	100%
Standard Deviation	0.3%	0.5%	0.4%
FinanceBench - Monte-Carlo OpenCL (ms)	**2585**	579.523733	**433.370858**
Normalized	16.77%	74.78%	100%
Standard Deviation	8.3%	7.7%	0.9%
FinanceBench - B.S.O (ms)	**25.826923**	6.343	**4.179**
Normalized	16.18%	65.88%	100%
Standard Deviation	0.6%	3.2%	0.5%
SHOC Scalable HeterOgeneous Computing - OpenCL - Triad (GB/s)	**10.9236**	14.0210	**21.3040**
Normalized	51.27%	65.81%	100%
Standard Deviation	6.8%	7.4%	1.9%
SHOC Scalable HeterOgeneous Computing - OpenCL - FFT SP (GFLOPS)	**38.9719**	140.162	**156.162**
Normalized	24.96%	89.75%	100%
Standard Deviation	0.3%	0.5%	0.8%
SHOC Scalable HeterOgeneous Computing - OpenCL - MD5 Hash (GHash/s)	**0.3691**	0.6778	**1.6775**
Normalized	22%	40.41%	100%
Standard Deviation	0%	0.1%	0%

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SHOC Scalable HeterOgeneous Computing - OpenCL - Max SP Flops (GFLOPS)	**1681**	5323	**7821**
Normalized	21.5%	68.06%	100%
Standard Deviation	0.1%	0.1%	0%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Download (GB/s)	**23.3048**	40.1640	**58.4143**
Normalized	39.9%	68.76%	100%
Standard Deviation	8.6%	1%	2.9%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Readback (GB/s)	**23.9319**	41.7406	**60.4048**
Normalized	39.62%	69.1%	100%
Standard Deviation	9.3%	3.9%	1%
SHOC Scalable HeterOgeneous Computing - OpenCL - T.R.B (GB/s)	**54.2625**	174.162	**189.757**
Normalized	28.6%	91.78%	100%
Standard Deviation	0%	1.7%	0%
ViennaCL - O.L.F (GFLOPS)	**24.6746**	48.9117	**73.8162**
Normalized	33.43%	66.26%	100%
Standard Deviation	0.3%	1.3%	0.4%
cl-mem - Copy (GB/s)	**21.6**	35.9	**48.0**
Normalized	45%	74.79%	100%
Standard Deviation	1.9%	0.5%	0.1%
cl-mem - Read (GB/s)	**22.7**	41.3	**57.1**
Normalized	39.75%	72.33%	100%
Standard Deviation	1.8%	0.7%	2.3%
cl-mem - Write (GB/s)	**24.0**	34.4	**47.9**
Normalized	50.1%	71.82%	100%
Standard Deviation	2.7%	5%	0.8%
LeelaChessZero - OpenCL (Nodes/s)	**389**	579	**1535**
Normalized	25.34%	37.72%	100%
Standard Deviation	2.3%	2.4%	0.9%
NCNN - Vulkan GPU - squeezenet (ms)	**28.27**	24.65	**11.51**
Normalized	40.71%	46.69%	100%
Standard Deviation	0.4%	2.2%	0.3%
NCNN - Vulkan GPU - mobilenet (ms)	**25.74**	22.36	**9.74**
Normalized	37.84%	43.56%	100%
Standard Deviation	2.6%	1.6%	1.2%
NCNN - Vulkan GPU-v2-v2 - mobilenet-v2	**8.27**	7.53	**4.62**
Normalized	55.86%	61.35%	100%
Standard Deviation	0.8%	1.3%	2.3%
NCNN - Vulkan GPU-v3-v3 - mobilenet-v3	**9.19**	8.65	**5.47**
Normalized	59.52%	63.24%	100%
Standard Deviation	0.3%	0.2%	1.4%
NCNN - Vulkan GPU - shufflenet-v2 (ms)	**6.75**	5.71	**3.05**
Normalized	45.19%	53.42%	100%
Standard Deviation	0.5%	1%	0.9%
NCNN - Vulkan GPU - mnasnet (ms)	**8.36**	7.65	**5.14**
Normalized	61.48%	67.19%	100%
Standard Deviation	0.3%	1.1%	9.7%
NCNN - Vulkan GPU - efficientnet-b0 (ms)	16.52	**16.72**	**11.05**
Normalized	66.89%	66.09%	100%
Standard Deviation	0.1%	0.1%	0.4%
NCNN - Vulkan GPU - blazeface (ms)	**1.81**	**1.81**	**0.98**
Normalized	54.14%	54.14%	100%
Standard Deviation	3.9%	1.8%	3.5%

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NCNN - Vulkan GPU - googlenet (ms)	**23.72**	18.62	**10.51**
Normalized	44.31%	56.44%	100%
Standard Deviation	0.5%	0.1%	0.5%
NCNN - Vulkan GPU - vgg16 (ms)	**152.79**	96.32	**38.44**
Normalized	25.16%	39.91%	100%
Standard Deviation	0.1%	0.1%	0.1%
NCNN - Vulkan GPU - resnet18 (ms)	**23.89**	17.12	**7.18**
Normalized	30.05%	41.94%	100%
Standard Deviation	0%	0.2%	0.6%
NCNN - Vulkan GPU - alexnet (ms)	**25.77**	16.63	**9.47**
Normalized	36.75%	56.95%	100%
Standard Deviation	0.1%	0.3%	0.1%
NCNN - Vulkan GPU - resnet50 (ms)	**51.46**	35.91	**15.49**
Normalized	30.1%	43.14%	100%
Standard Deviation	0.1%	0.2%	0.2%
NCNN - Vulkan GPU - yolov4-tiny (ms)	**62.81**	38.95	**15.26**
Normalized	24.3%	39.18%	100%
Standard Deviation	0.8%	0.7%	0.2%
PlaidML - No - Inference - VGG16 - OpenCL (FPS)	**8.18**	19.93	**22.18**
Normalized	36.88%	89.86%	100%
Standard Deviation	1.6%	5.9%	0.3%
PlaidML - No - Inference - VGG19 - OpenCL (FPS)	**6.42**	16.03	**17.49**
Normalized	36.71%	91.65%	100%
Standard Deviation	0.2%	2.2%	0.2%
PlaidML - No - Inference - IMDB LSTM - OpenCL (FPS)	**7.84**	20.10	**30.52**
Normalized	25.69%	65.86%	100%
Standard Deviation	0.4%	1%	2.3%
PlaidML - No - Inference - Mobilenet - OpenCL (FPS)	**116.08**	242.83	**299.60**
Normalized	38.74%	81.05%	100%
Standard Deviation	0%	2.4%	0.5%
PlaidML - No - Inference - ResNet 50 - OpenCL (FPS)	**34.52**	75.57	**87.29**
Normalized	39.55%	86.57%	100%
Standard Deviation	1.8%	2.4%	0.1%
PlaidML - No - Inference - DenseNet 201 - OpenCL (FPS)	**5.81**	11.30	**22.44**
Normalized	25.89%	50.36%	100%
Standard Deviation	0.4%	1.2%	0.7%
PlaidML - No - Inference - Inception V3 - OpenCL (FPS)	**15.90**	34.82	**46.37**
Normalized	34.29%	75.09%	100%
Standard Deviation	1.7%	0.4%	0.1%
PlaidML - No - Inference - NASNer Large - OpenCL (FPS)	**1.84**	3.31	**5.14**
Normalized	35.8%	64.4%	100%
Standard Deviation	0.5%	0.3%	0%
JuliaGPU - GPU (Samples/sec)	**47930813**	85184313	**132508055**
Normalized	36.17%	64.29%	100%
Standard Deviation	0%	3%	2.6%
MandelGPU - GPU (Samples/sec)	**10702353**	23689429	**44609195**

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Normalized	23.99%	53.1%	100%
Standard Deviation	0%	1.7%	1.2%
clpeak - Kernel Latency (us)	34.12	**36.89**	**29.53**
Normalized	86.55%	80.05%	100%
Standard Deviation	2.3%	0.7%	0.5%
clpeak - S.P.F (GFLOPS)	**438.06**	1039	**1775**
Normalized	24.68%	58.52%	100%
Standard Deviation	0%	0.1%	0%
clpeak - G.M.B (GBPS)	**26.73**	45.94	**57.02**
Normalized	46.88%	80.57%	100%
Standard Deviation	0.6%	0.1%	0.1%
clpeak - T.B.e (GBPS)	**31.64**	39.48	**52.15**
Normalized	60.67%	75.7%	100%
Standard Deviation	0.1%	6.4%	1%
ET: Legacy - Renderer2 - 1920 x 1200 (FPS)	**72.1**	86.4	**122.3**
Normalized	58.95%	70.65%	100%
Standard Deviation	0.1%	8.2%	2.9%
Tesseract - 1920 x 1200 (FPS)	**65.22251**	109.4669	**140.3486**
Normalized	46.47%	78%	100%
Standard Deviation	1.2%	2.3%	1.1%
Unigine Heaven - 1920 x 1200 - Fullscreen - OpenGL (FPS)	**10.3701**	16.1363	**28.6453**
Normalized	36.2%	56.33%	100%
Standard Deviation	0.3%	4.5%	0.4%
Unigine Superposition - 1920 x 1200 - Fullscreen - Low - OpenGL (FPS)	**12.2**	17.0	**29.6**
Normalized	41.22%	57.43%	100%
Standard Deviation	0.5%	0.9%	0.8%
Unigine Superposition - 1920 x 1200 - Fullscreen - Medium - OpenGL (FPS)	**5.8**	9.0	**16.4**
Normalized	35.37%	54.88%	100%
Standard Deviation	1%	0.6%	0%
Unigine Valley - 1920 x 1200 - Fullscreen - OpenGL (FPS)	**11.4067**	17.7436	**30.6054**
Normalized	37.27%	57.98%	100%
Standard Deviation	1%	1.1%	0.5%
Xonotic - 1920 x 1200 - Low (FPS)	**183.6211229**	209.1609960	**307.6345501**
Normalized	59.69%	67.99%	100%
Standard Deviation	0.1%	2.9%	2.9%
Xonotic - 1920 x 1200 - High (FPS)	**111.6753218**	144.1207832	**183.8028138**
Normalized	60.76%	78.41%	100%
Standard Deviation	1.3%	2.8%	2.4%
Xonotic - 1920 x 1200 - Ultra (FPS)	**93.2094800**	123.2383929	**155.3708840**
Normalized	59.99%	79.32%	100%
Standard Deviation	1%	2.6%	1.5%
Xonotic - 1920 x 1200 - Ultimate (FPS)	**71.6067804**	99.2365089	**121.9041377**
Normalized	58.74%	81.41%	100%
Standard Deviation	1.1%	2.7%	1.5%
GpuTest - GiMark - 1920 x 1200 - Fullscreen (Points)	**1314**	1724	**2017**
Normalized	65.15%	85.47%	100%
Standard Deviation	0.8%	1%	0.1%

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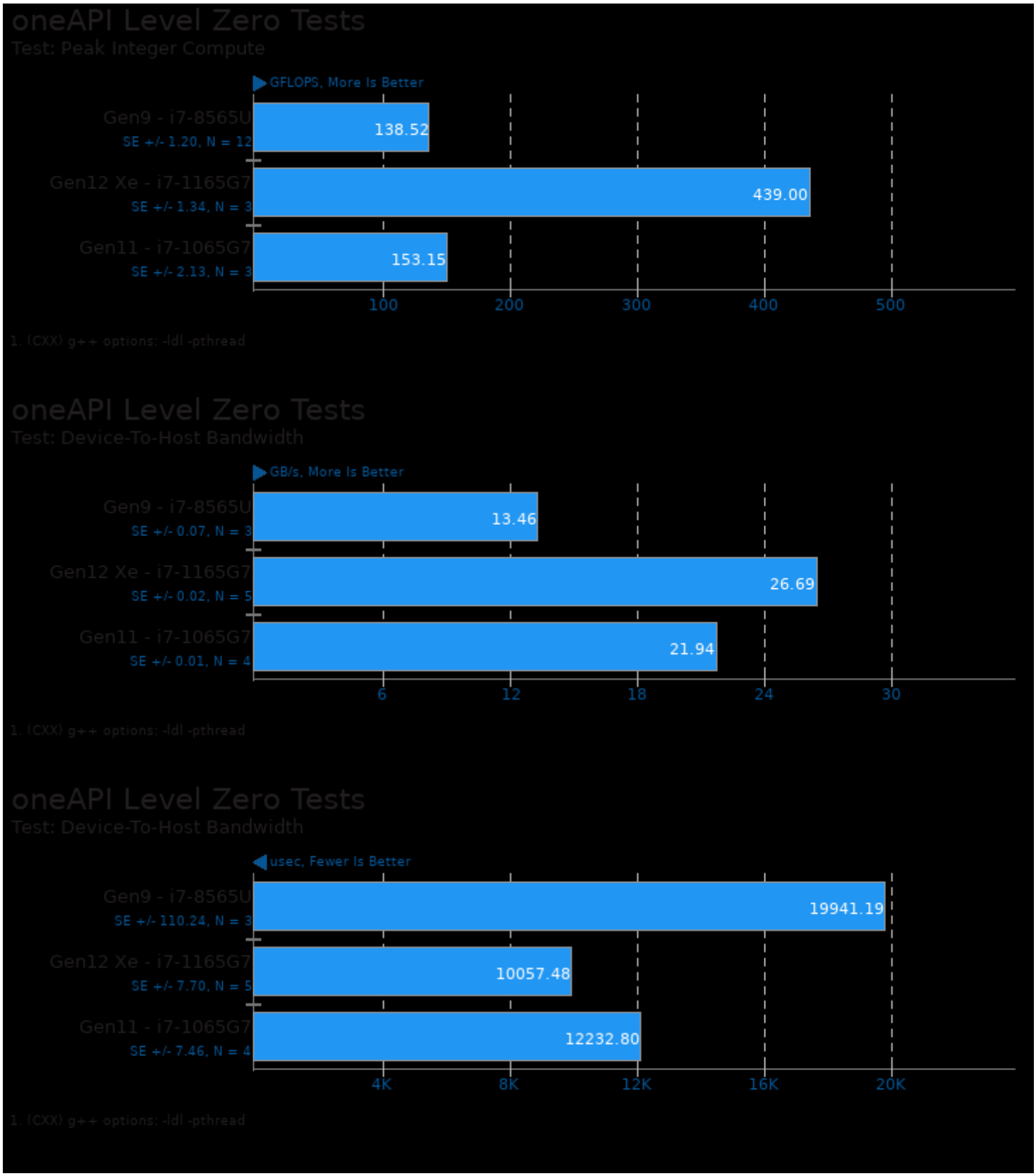
GpuTest - Furmark - 1920 x 1200 - Fullscreen (Points)	**672**	1062	**1782**
Normalized	37.71%	59.6%	100%
Standard Deviation	2.2%	2.5%	2.6%
GpuTest - TessMark - 1920 x 1200 - Fullscreen (Points)	**2840**	3602	**5080**
Normalized	55.91%	70.91%	100%
Standard Deviation	1.5%	1.3%	0.9%
GpuTest - Pixmark Piano - 1920 x 1200 - Fullscreen (Points)	**149**	288	**584**
Normalized	25.51%	49.32%	100%
Standard Deviation		1%	1.9%
GpuTest - Pixmark Volplosion - 1920 x 1200 - Fullscreen (Points)	**390**	761	**1595**
Normalized	24.45%	47.71%	100%
Standard Deviation		1.1%	1.6%
Waifu2x-NCNN Vulkan - 2x - 3 - No (sec)	**10.288**	7.062	**4.095**
Normalized	39.8%	57.99%	100%
Standard Deviation	0.6%	0.9%	0.9%
Waifu2x-NCNN Vulkan - 2x - 3 - Yes (sec)	**75.252**	53.103	**27.216**
Normalized	36.17%	51.25%	100%
Standard Deviation	0.1%	3%	0.2%
oneAPI Level Zero Tests - P.I.C (GFLOPS/Watt)	**4.31**	9.15	**20.00**
Normalized	21.55%	45.75%	100%
oneAPI Level Zero Tests - P.H.P.C (GFLOPS/Watt)	**24.17**	73.98	**135.36**
Normalized	17.86%	54.65%	100%
oneAPI Level Zero Tests - P.S.P.C	**13.93**	**59.52**	54.99
Normalized	23.4%	100%	92.39%
oneAPI Level Zero Tests - H.T.D.T.H.I.C (GB/s/Watt)	**0.14**	0.68	**0.94**
Normalized	14.89%	72.34%	100%
oneAPI Level Zero Tests - P.F.G.M.B (GB/s/Watt)	**0.85**	2.24	**2.49**
Normalized	34.14%	89.96%	100%
oneAPI Level Zero Tests - P.S.M.C.t.S.M (GB/s/Watt)	**0.36**	**0.90**	0.67
Normalized	40%	100%	74.44%
SHOC Scalable HeterOgeneous Computing - OpenCL - Triad (GB/s/Watt)	**0.92**	1.68	**1.92**
Normalized	47.92%	87.5%	100%
SHOC Scalable HeterOgeneous Computing - OpenCL - FFT SP (GFLOPS/Watt)	**2.21**	17.77	**17.81**
Normalized	12.41%	99.78%	100%
SHOC Scalable HeterOgeneous Computing - OpenCL - MD5 Hash (GHash/s/Watt)	**0.02**	0.03	**0.07**
Normalized	28.57%	42.86%	100%
SHOC Scalable HeterOgeneous Computing - OpenCL - Max SP Flops (GFLOPS/Watt)	**72.86**	265.36	**343.74**
Normalized	21.2%	77.2%	100%

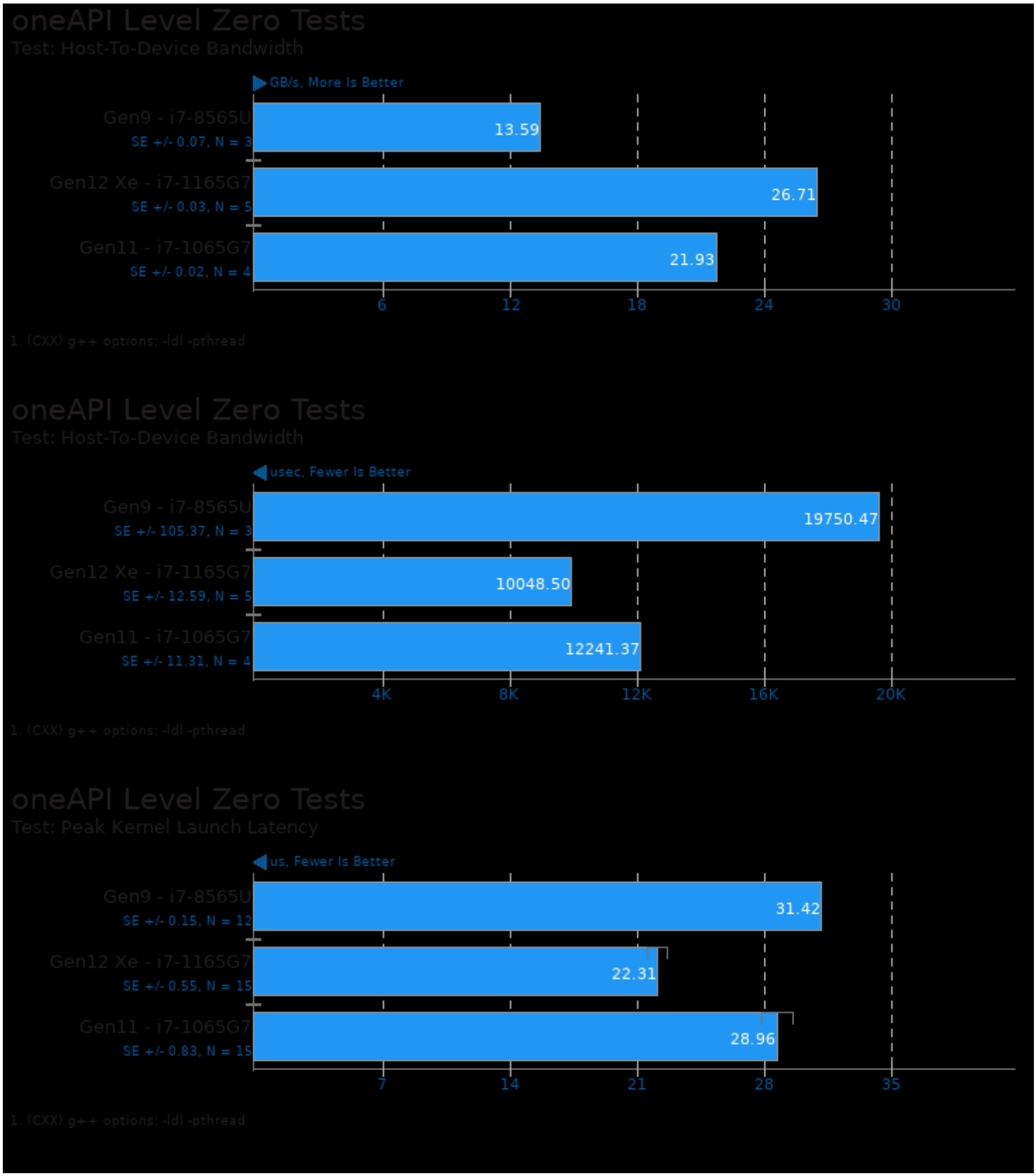
Tigerlake Xe Gen12 to Gen9

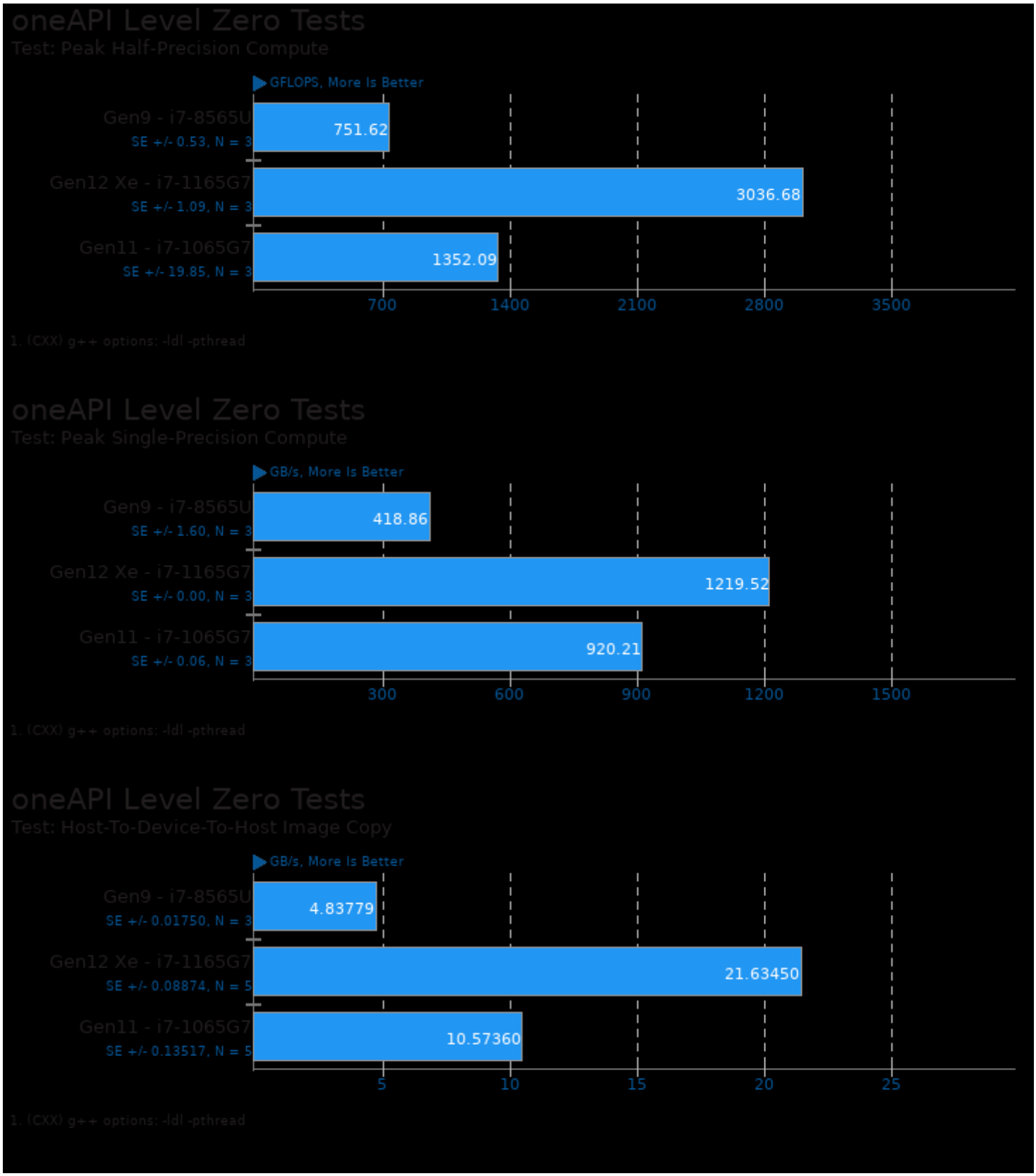
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Download (GB/s/Watt)	2.65	6.84	7.04
Normalized	37.64%	97.16%	100%
SHOC Scalable HeterOgeneous Computing - OpenCL - Bus Speed Readback (GB/s/Watt)	2.69	6.82	7.39
Normalized	36.4%	92.29%	100%
SHOC Scalable HeterOgeneous Computing - OpenCL - T.R.B (GB/s/Watt)	2.59	10.35	8.35
Normalized	25.02%	100%	80.68%
ViennaCL - O.L.F (GFLOPS/Watt)	1.86	5.86	6.64
Normalized	28.01%	88.25%	100%
cl-mem - Copy (GB/s/Watt)	1.09	1.95	2.02
Normalized	53.96%	96.53%	100%
cl-mem - Read (GB/s/Watt)	1.15	2.70	2.45
Normalized	42.59%	100%	90.74%
cl-mem - Write (GB/s/Watt)	1.21	2.31	2.08
Normalized	52.38%	100%	90.04%
LeelaChessZero - OpenCL (Nodes/s/Watt)	14.05	37.81	70.05
Normalized	20.06%	53.98%	100%
PlaidML - No - Inference - VGG16 - OpenCL (FPS/Watt)	0.26	1.21	1.07
Normalized	21.49%	100%	88.43%
PlaidML - No - Inference - VGG19 - OpenCL (FPS/Watt)	0.21	0.98	0.86
Normalized	21.43%	100%	87.76%
PlaidML - No - Inference - IMDB LSTM - OpenCL (FPS/Watt)	0.24	1.24	1.40
Normalized	17.14%	88.57%	100%
PlaidML - No - Inference - Mobilenet - OpenCL (FPS/Watt)	3.63	15.04	13.59
Normalized	24.14%	100%	90.36%
PlaidML - No - Inference - ResNet 50 - OpenCL (FPS/Watt)	1.10	4.79	4.04
Normalized	22.96%	100%	84.34%
PlaidML - No - Inference - DenseNet 201 - OpenCL (FPS/Watt)	0.22	0.75	1.02
Normalized	21.57%	73.53%	100%
PlaidML - No - Inference - Inception V3 - OpenCL (FPS/Watt)	0.54	2.31	2.14
Normalized	23.38%	100%	92.64%
PlaidML - No - Inference - NASNer Large - OpenCL (FPS/Watt)	0.06	0.22	0.24
Normalized	25%	91.67%	100%
JuliaGPU - GPU (Samples/sec/Watt)	1343813	5650341	5935646
Normalized	22.64%	95.19%	100%
MandelGPU - GPU (Samples/sec/Watt)	468417	1544709	1974932
Normalized	23.72%	78.22%	100%
clpeak - S.P.F (GFLOPS/Watt)	20.31	58.93	80.98
Normalized	25.08%	72.77%	100%
clpeak - G.M.B (GBPS/Watt)	0.92	2.71	2.54
Normalized	33.95%	100%	93.73%
clpeak - T.B.e (GBPS/Watt)	2.60	3.45	3.44

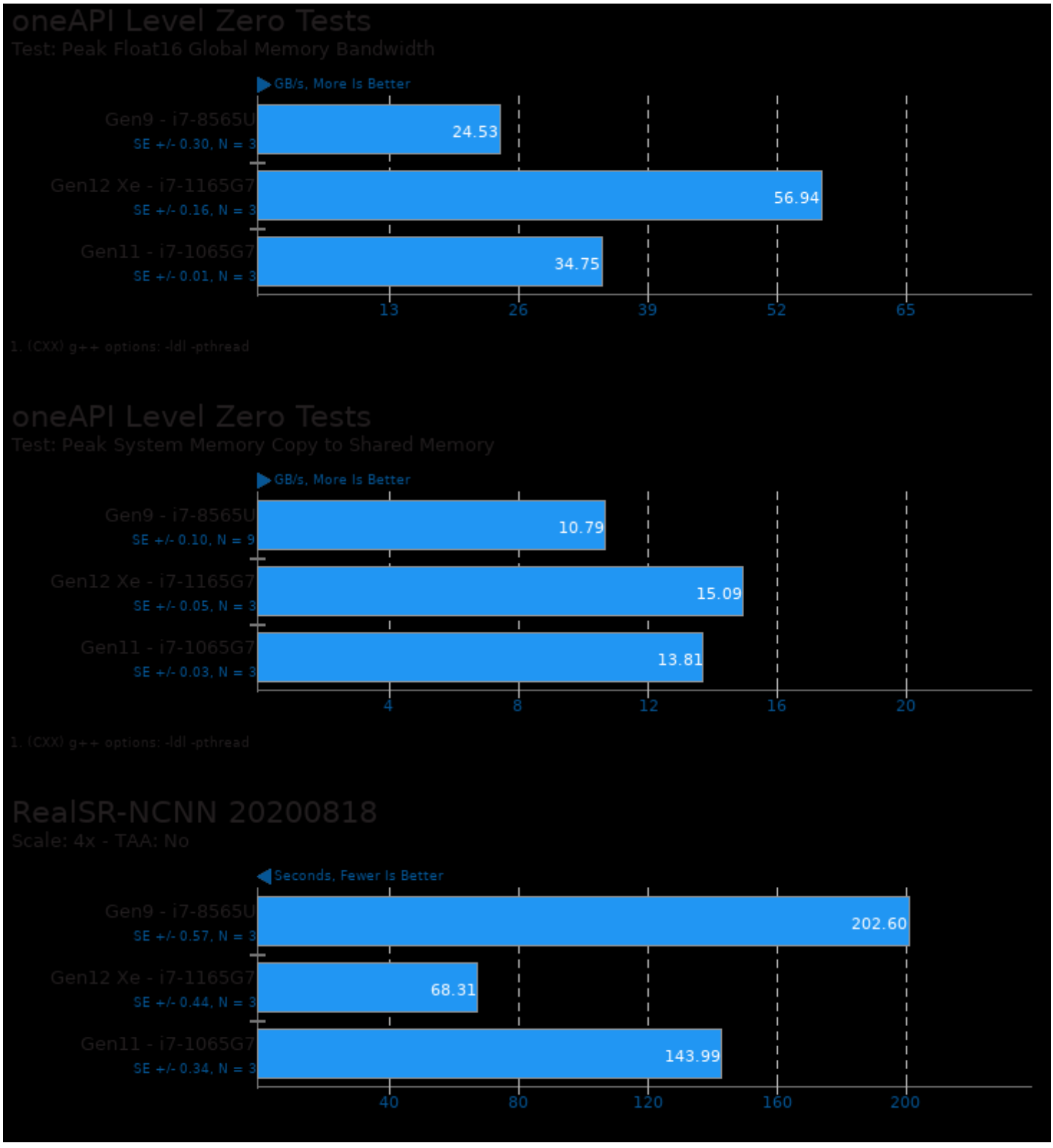
Tigerlake Xe Gen12 to Gen9

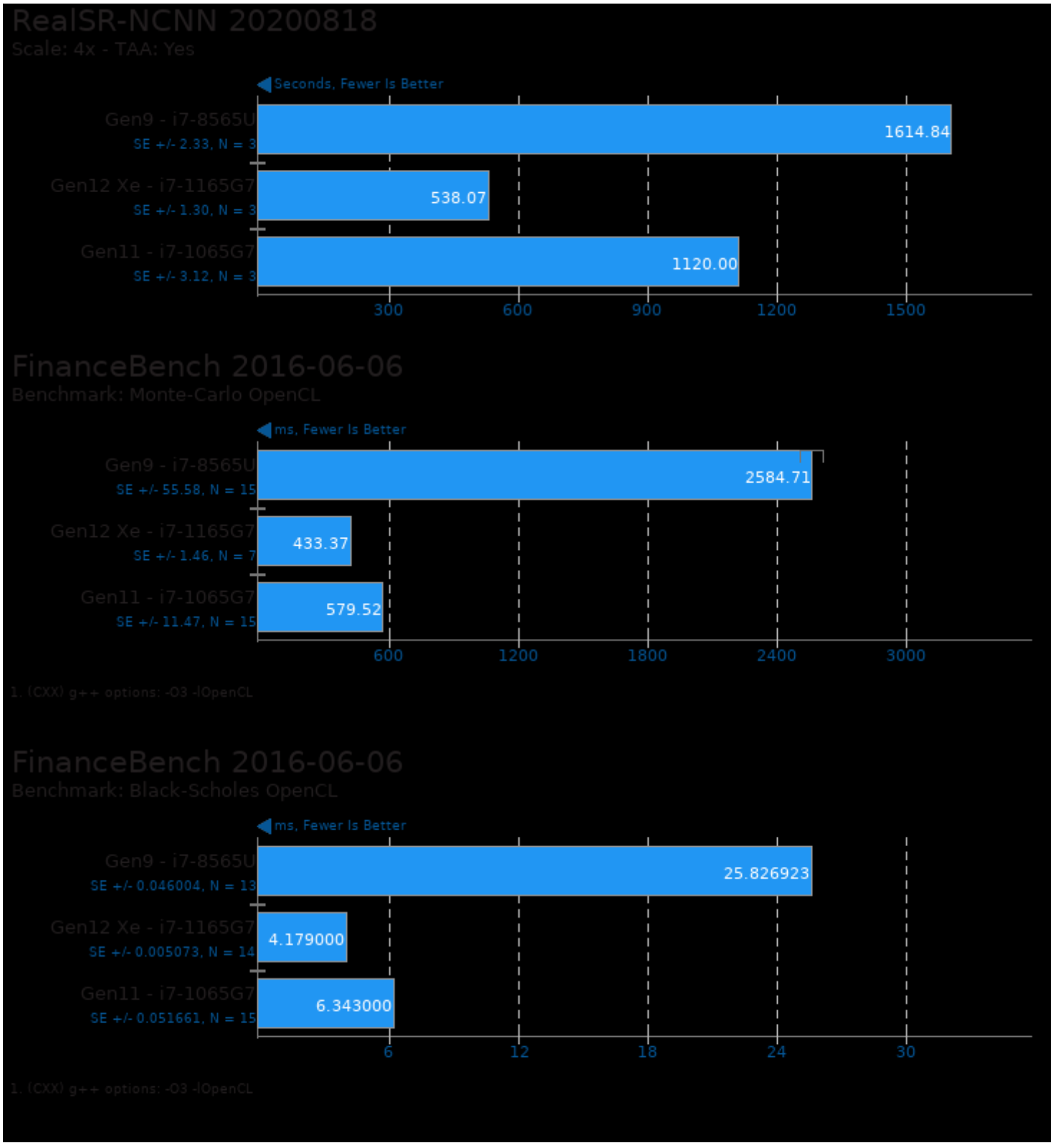
Normalized	75.36%	100%	99.71%
ET: Legacy - Renderer2 - 1920 x 1200 (FPS/Watt)	3.41	5.40	5.59
Normalized	61%	96.6%	100%
Tesseract - 1920 x 1200 (FPS/Watt)	2.61	5.00	6.28
Normalized	41.56%	79.62%	100%
Unigine Heaven - 1920 x 1200 - Fullscreen - OpenGL (FPS/Watt)	0.38	0.81	1.31
Normalized	29.01%	61.83%	100%
Unigine Superposition - 1920 x 1200 - Fullscreen - Low - OpenGL (FPS/Watt)	0.48	0.89	1.34
Normalized	35.82%	66.42%	100%
Unigine Superposition - 1920 x 1200 - Fullscreen - Medium - OpenGL (FPS/Watt)	0.23	0.50	0.74
Normalized	31.08%	67.57%	100%
Unigine Valley - 1920 x 1200 - Fullscreen - OpenGL (FPS/Watt)	0.43	1.13	1.40
Normalized	30.71%	80.71%	100%
Xonotic - 1920 x 1200 - Low (FPS/Watt)	8.37	12.89	14.14
Normalized	59.19%	91.16%	100%
Xonotic - 1920 x 1200 - High (FPS/Watt)	4.25	8.81	8.28
Normalized	48.24%	100%	93.98%
Xonotic - 1920 x 1200 - Ultra (FPS/Watt)	3.44	7.51	7.06
Normalized	45.81%	100%	94.01%
Xonotic - 1920 x 1200 - Ultimate (FPS/Watt)	2.65	6.10	5.56
Normalized	43.44%	100%	91.15%
GpuTest - GiMark - 1920 x 1200 - Fullscreen (Points/Watt)	47.23	104.65	111.04
Normalized	42.53%	94.25%	100%
GpuTest - Furmark - 1920 x 1200 - Fullscreen (Points/Watt)	25.26	63.19	81.15
Normalized	31.13%	77.87%	100%
GpuTest - TessMark - 1920 x 1200 - Fullscreen (Points/Watt)	100.32	214.06	242.99
Normalized	41.29%	88.09%	100%
GpuTest - Pixmark Piano - 1920 x 1200 - Fullscreen (Points/Watt)	6.01	17.13	27.39
Normalized	21.94%	62.54%	100%
GpuTest - Pixmark Volplosion - 1920 x 1200 - Fullscreen (Points/Watt)	16.06	45.24	75.39
Normalized	21.3%	60.01%	100%

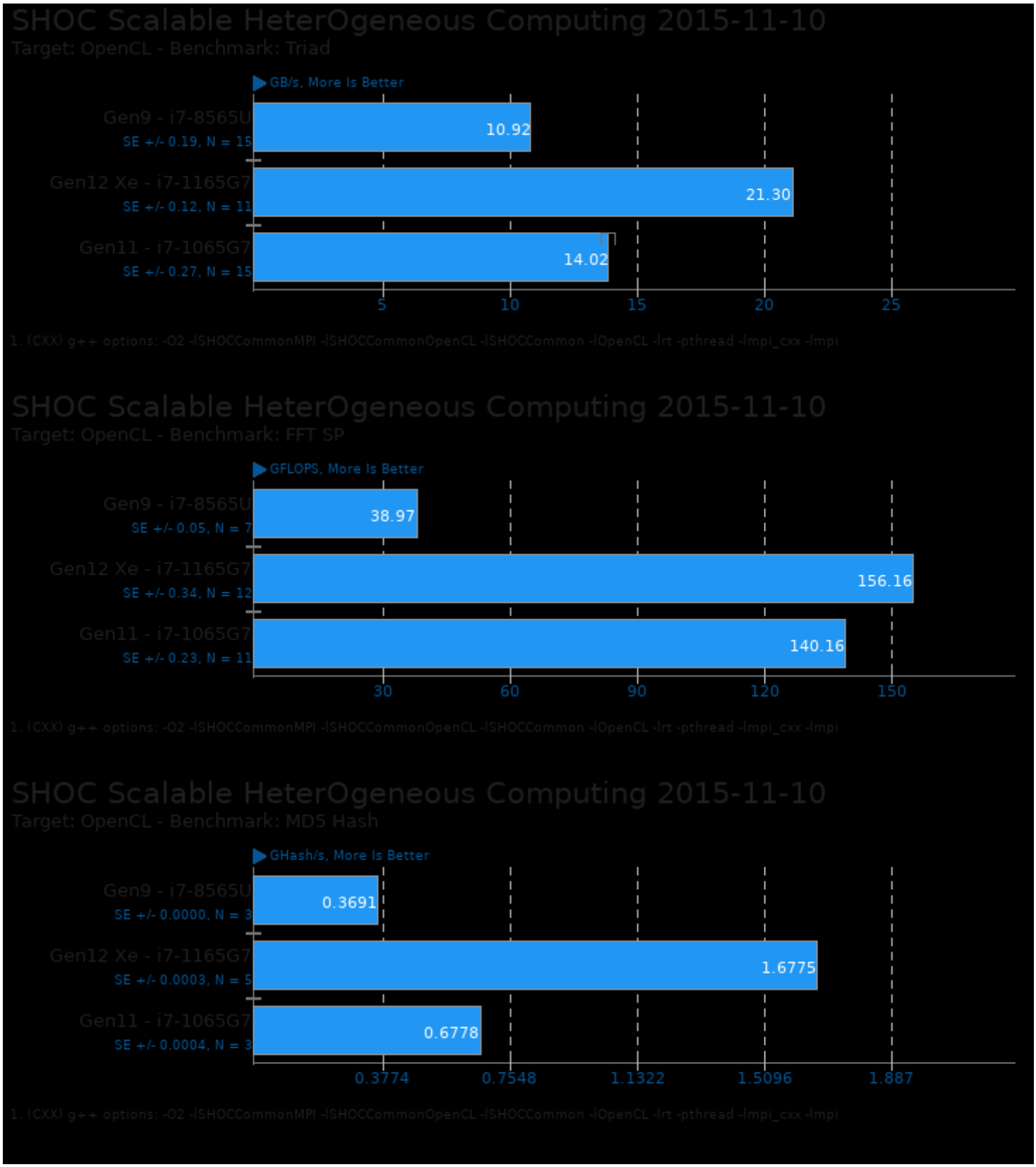

oneAPI Level Zero Tests
Test: Peak Integer Compute
GFLOPS, More Is Better
Gen9 - i7-8565U
SE +/- 1.20, N = 12
138.52
Gen12 Xe - i7-1165G7
SE +/- 1.34, N = 3
439.00
Gen11 - i7-1065G7
SE +/- 2.13, N = 3
153.15
100
200
300
400
500
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Device-To-Host Bandwidth
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.07, N = 3
13.46
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 5
26.69
Gen11 - i7-1065G7
SE +/- 0.01, N = 4
21.94
6
12
18
24
30
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Device-To-Host Bandwidth
usec, Fewer Is Better
Gen9 - i7-8565U
SE +/- 110.24, N = 3
19941.19
Gen12 Xe - i7-1165G7
SE +/- 7.70, N = 5
10057.48
Gen11 - i7-1065G7
SE +/- 7.46, N = 4
12232.80
4K
8K
12K
16K
20K
1. (CXX) g++ options: -ldl -pthread

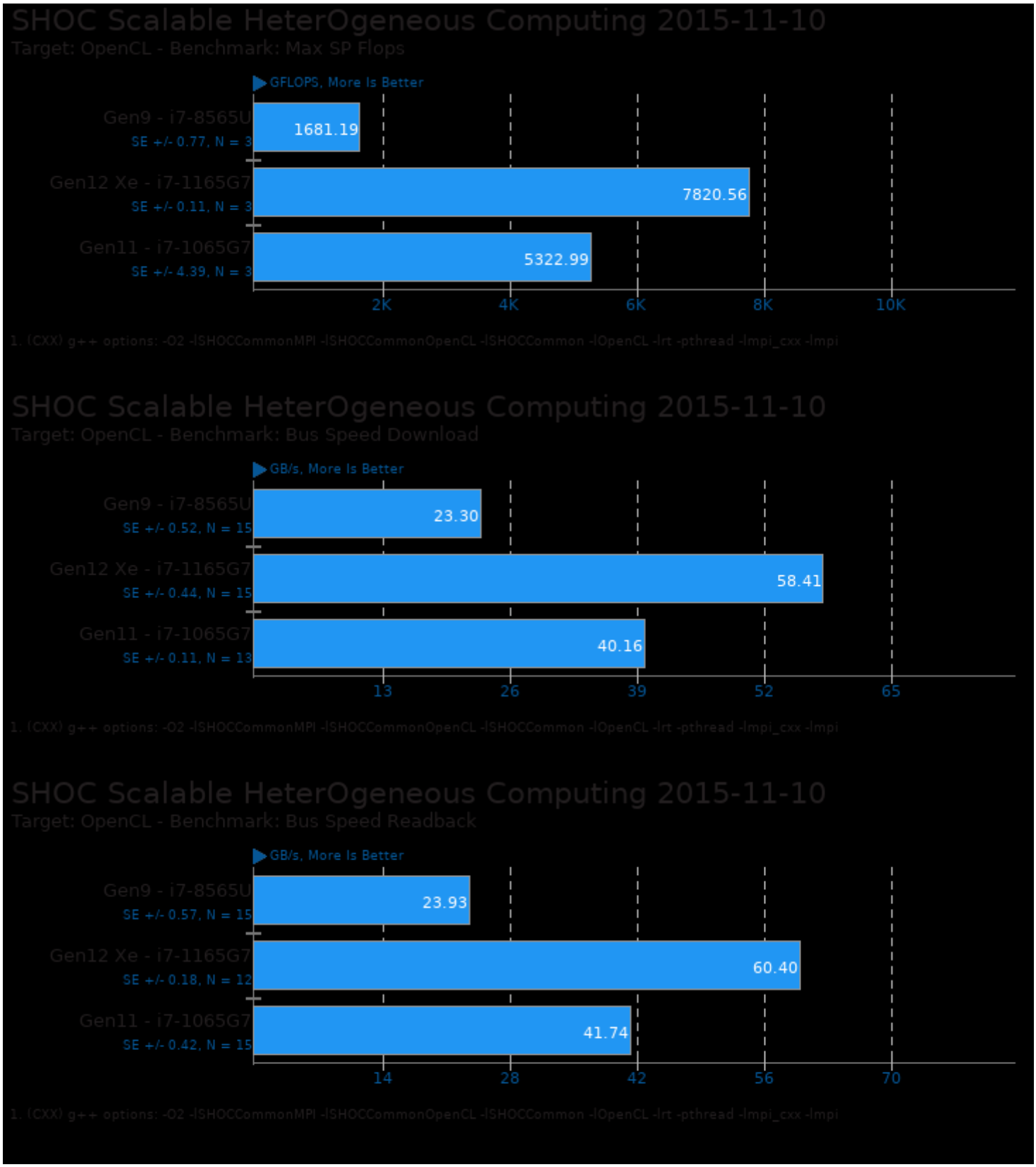

oneAPI Level Zero Tests
Test: Host-To-Device Bandwidth
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.07, N = 3
13.59
Gen12 Xe - i7-1165G7
SE +/- 0.03, N = 5
26.71
Gen11 - i7-1065G7
SE +/- 0.02, N = 4
21.93
6
12
18
24
30
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Host-To-Device Bandwidth
usec, Fewer Is Better
Gen9 - i7-8565U
SE +/- 105.37, N = 3
19750.47
Gen12 Xe - i7-1165G7
SE +/- 12.59, N = 5
10048.50
Gen11 - i7-1065G7
SE +/- 11.31, N = 4
12241.37
4K
8K
12K
16K
20K
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Peak Kernel Launch Latency
us, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.15, N = 12
31.42
Gen12 Xe - i7-1165G7
SE +/- 0.55, N = 15
22.31
Gen11 - i7-1065G7
SE +/- 0.83, N = 15
28.96
7
14
21
28
35
1. (CXX) g++ options: -ldl -pthread

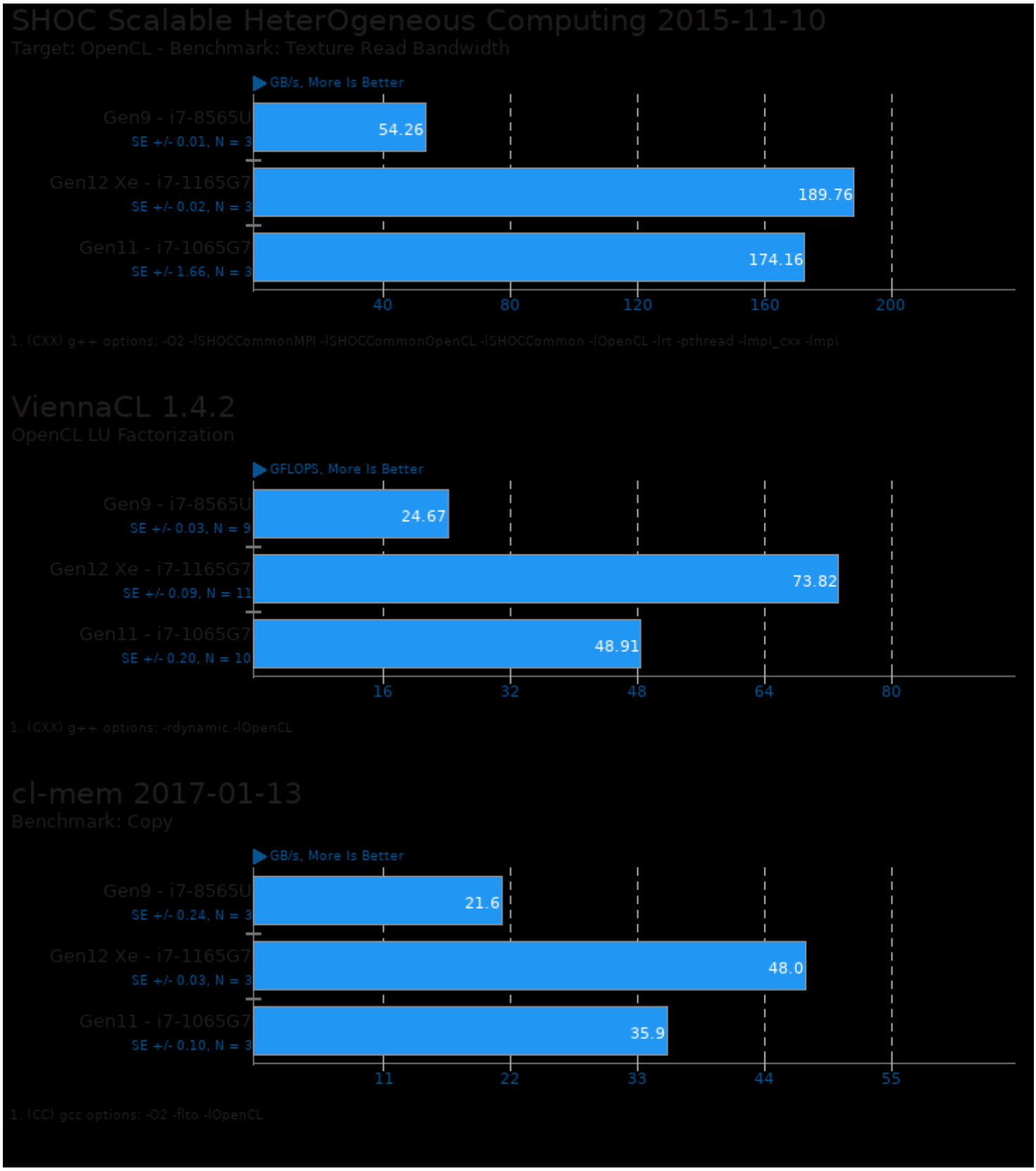

oneAPI Level Zero Tests
Test: Peak Half-Precision Compute
GFLOPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.53, N = 3
751.62
Gen12 Xe - i7-1165G7
SE +/- 1.09, N = 3
3036.68
Gen11 - i7-1065G7
SE +/- 19.85, N = 3
1352.09
700
1400
2100
2800
3500
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Peak Single-Precision Compute
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 1.60, N = 3
418.86
Gen12 Xe - i7-1165G7
SE +/- 0.00, N = 3
1219.52
Gen11 - i7-1065G7
SE +/- 0.06, N = 3
920.21
300
600
900
1200
1500
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Host-To-Device-To-Host Image Copy
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.01750, N = 3
4.83779
Gen12 Xe - i7-1165G7
SE +/- 0.08874, N = 5
21.63450
Gen11 - i7-1065G7
SE +/- 0.13517, N = 5
10.57360
5
10
15
20
25
1. (CXX) g++ options: -ldl -pthread


oneAPI Level Zero Tests
Test: Peak Float16 Global Memory Bandwidth
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.30, N = 3
24.53
Gen12 Xe - i7-1165G7
SE +/- 0.16, N = 3
56.94
Gen11 - i7-1065G7
SE +/- 0.01, N = 3
34.75
13
26
39
52
65
1. (CXX) g++ options: -ldl -pthread
oneAPI Level Zero Tests
Test: Peak System Memory Copy to Shared Memory
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.10, N = 9
10.79
Gen12 Xe - i7-1165G7
SE +/- 0.05, N = 3
15.09
Gen11 - i7-1065G7
SE +/- 0.03, N = 3
13.81
4
8
12
16
20
1. (CXX) g++ options: -ldl -pthread
RealSR-NCNN 20200818
Scale: 4x - TAA: No
Seconds, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.57, N = 3
202.60
Gen12 Xe - i7-1165G7
SE +/- 0.44, N = 3
68.31
Gen11 - i7-1065G7
SE +/- 0.34, N = 3
143.99
40
80
120
160
200

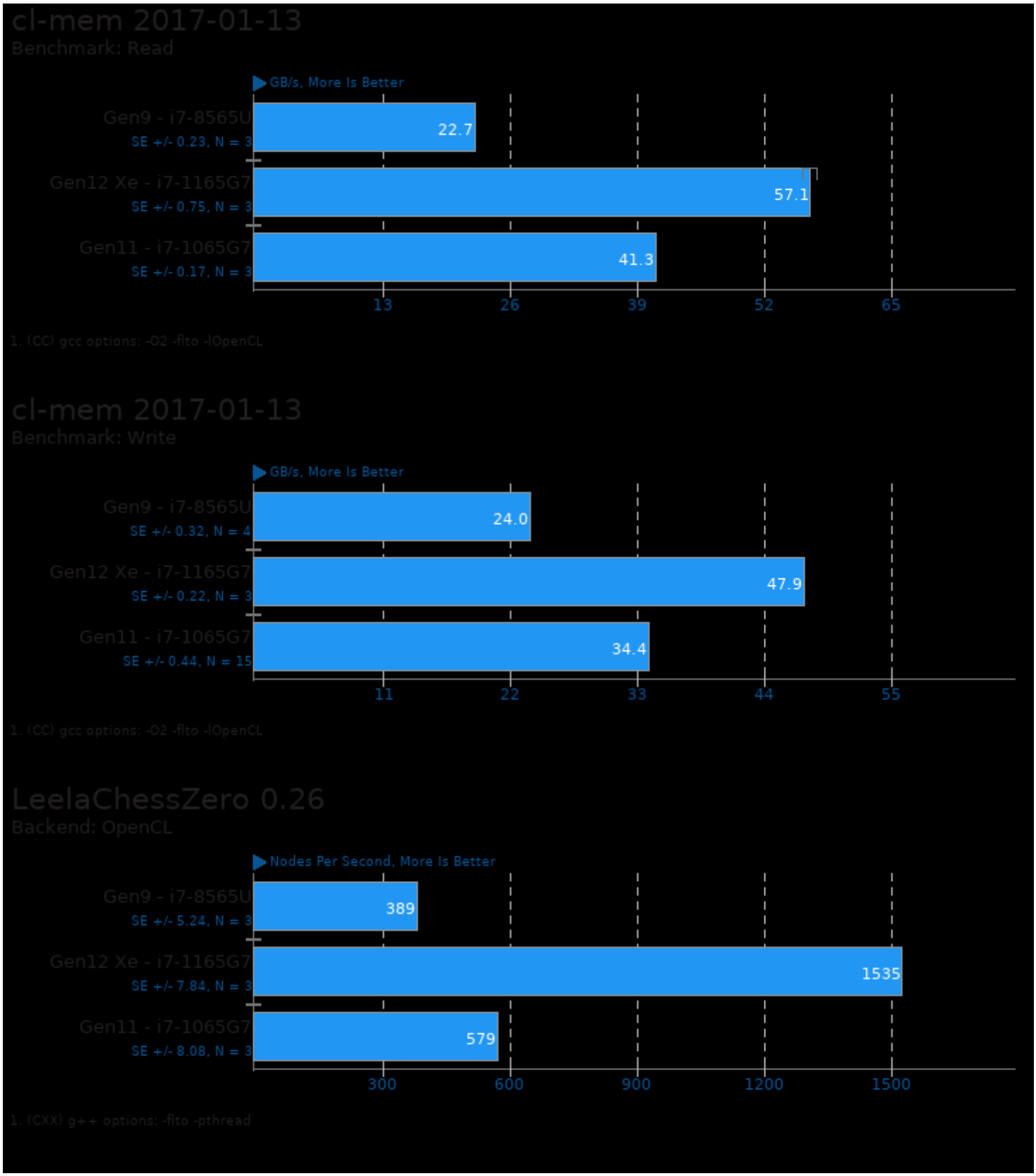

RealSR-NCNN 20200818
Scale: 4x - TAA: Yes
Seconds, Fewer Is Better
Gen9 - i7-8565U
SE +/- 2.33, N = 3
1614.84
Gen12 Xe - i7-1165G7
SE +/- 1.30, N = 3
538.07
Gen11 - i7-1065G7
SE +/- 3.12, N = 3
1120.00
300
600
900
1200
1500
FinanceBench 2016-06-06
Benchmark: Monte-Carlo OpenCL
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 55.58, N = 15
2584.71
Gen12 Xe - i7-1165G7
SE +/- 1.46, N = 7
433.37
Gen11 - i7-1065G7
SE +/- 11.47, N = 15
579.52
600
1200
1800
2400
3000
1. (CXX) g++ options: -O3 -lOpenCL
FinanceBench 2016-06-06
Benchmark: Black-Scholes OpenCL
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.046004, N = 13
25.826923
Gen12 Xe - i7-1165G7
SE +/- 0.005073, N = 14
4.179000
Gen11 - i7-1065G7
SE +/- 0.051661, N = 15
6.343000
6
12
18
24
30
1. (CXX) g++ options: -O3 -lOpenCL

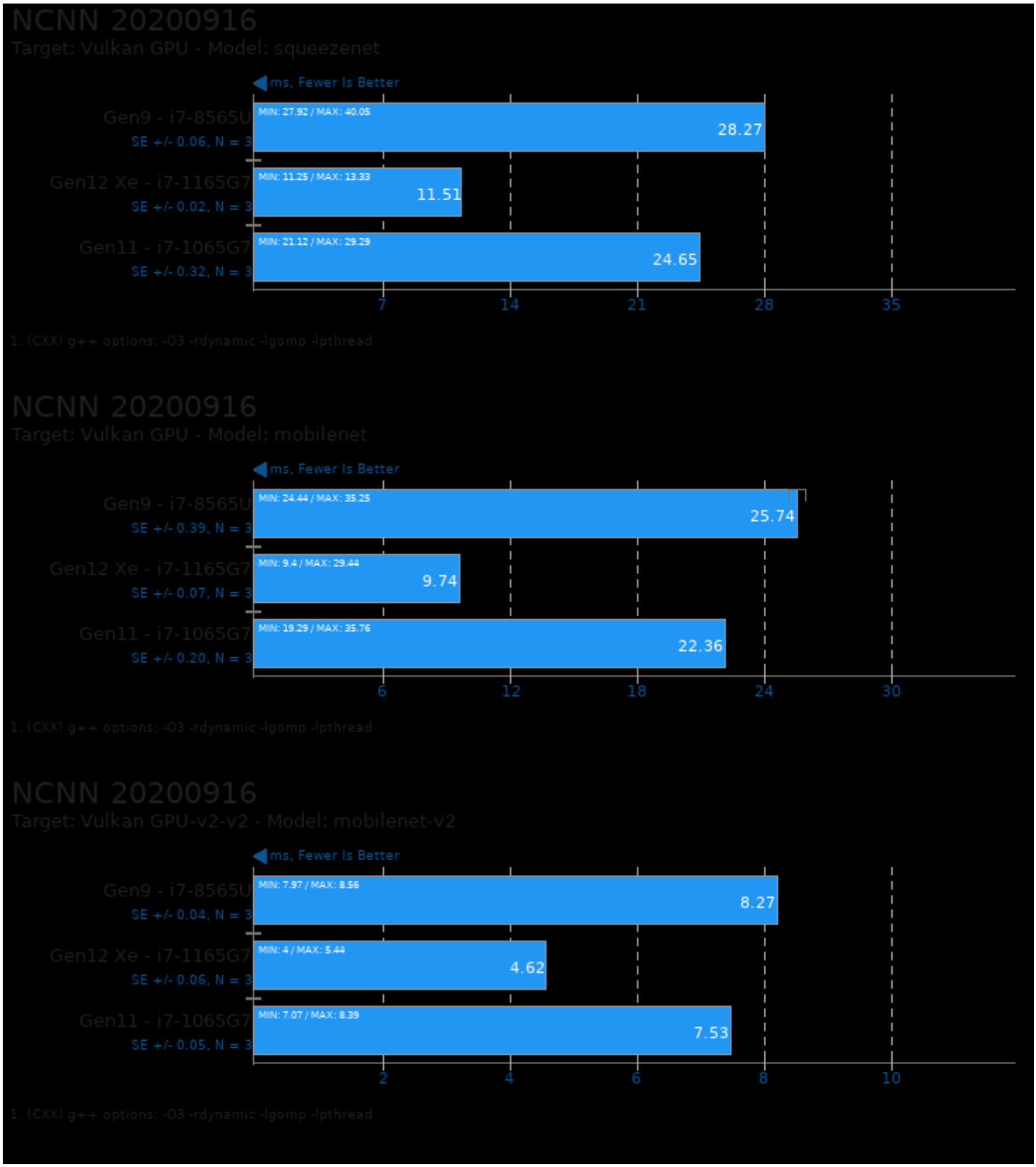

SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Triad
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.19, N = 15
10.92
Gen12 Xe - i7-1165G7
SE +/- 0.12, N = 11
21.30
Gen11 - i7-1065G7
SE +/- 0.27, N = 15
14.02
5
10
15
20
25
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: FFT SP
GFLOPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.05, N = 7
38.97
Gen12 Xe - i7-1165G7
SE +/- 0.34, N = 12
156.16
Gen11 - i7-1065G7
SE +/- 0.23, N = 11
140.16
30
60
90
120
150
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: MD5 Hash
GHash/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.0000, N = 3
0.3691
Gen12 Xe - i7-1165G7
SE +/- 0.0003, N = 5
1.6775
Gen11 - i7-1065G7
SE +/- 0.0004, N = 3
0.6778
0.3774
0.7548
1.1322
1.5096
1.887
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi


SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Max SP Flops
GFLOPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.77, N = 3
1681.19
Gen12 Xe - i7-1165G7
SE +/- 0.11, N = 3
7820.56
Gen11 - i7-1065G7
SE +/- 4.39, N = 3
5322.99
2K
4K
6K
8K
10K
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Bus Speed Download
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.52, N = 15
23.30
Gen12 Xe - i7-1165G7
SE +/- 0.44, N = 15
58.41
Gen11 - i7-1065G7
SE +/- 0.11, N = 13
40.16
13
26
39
52
65
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Bus Speed Readback
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.57, N = 15
23.93
Gen12 Xe - i7-1165G7
SE +/- 0.18, N = 12
60.40
Gen11 - i7-1065G7
SE +/- 0.42, N = 15
41.74
14
28
42
56
70
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi

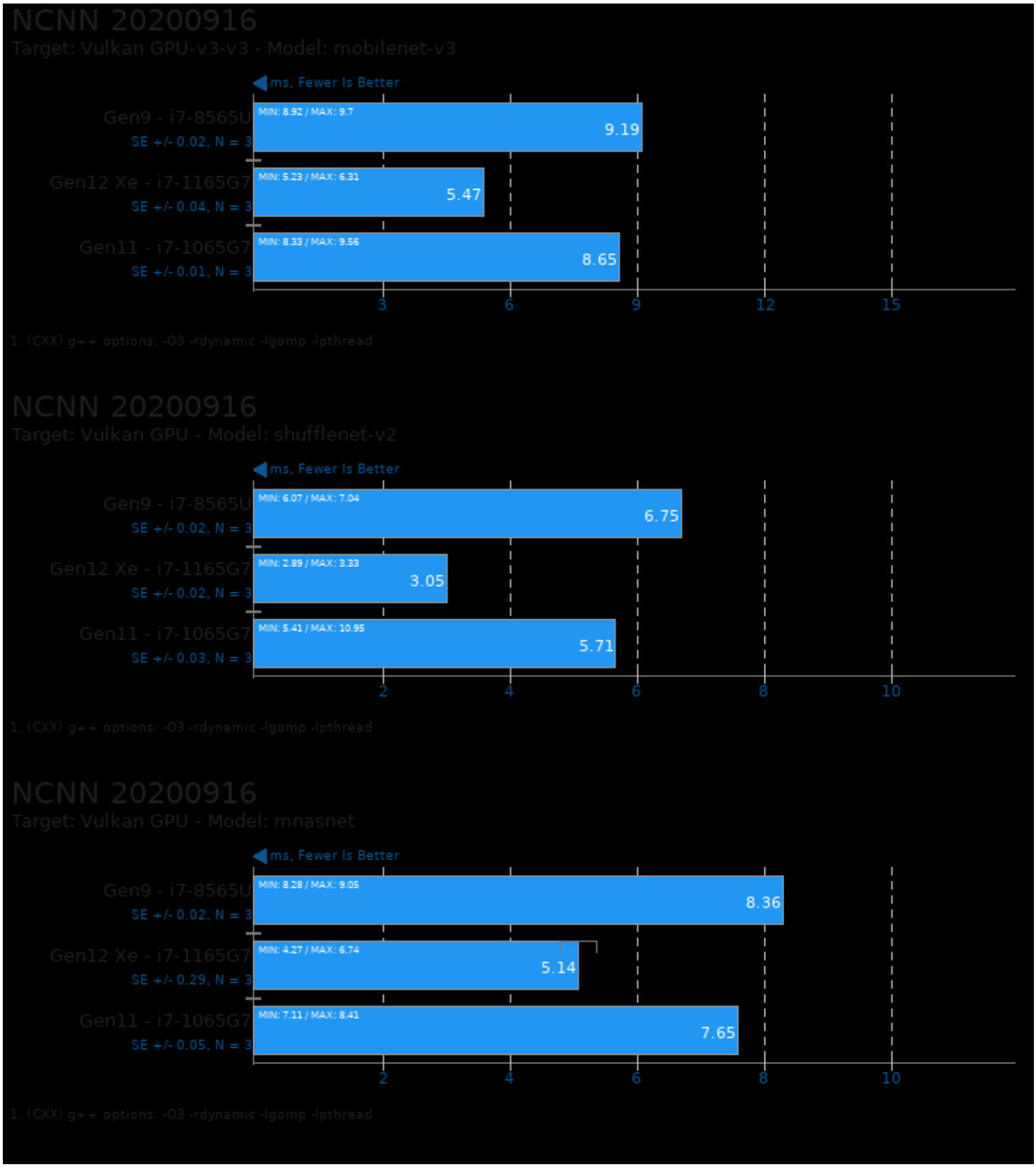

SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Texture Read Bandwidth
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.01, N = 3
54.26
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
189.76
Gen11 - i7-1065G7
SE +/- 1.66, N = 3
174.16
40
80
120
160
200
1. (CXX) g++ options: -O2 -lSHOCCommonMPI -lSHOCCommonOpenCL -lSHOCCommon -lOpenCL -lrt -pthread -lmpi_cxx -lmpi
ViennaCL 1.4.2
OpenCL LU Factorization
GFLOPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.03, N = 9
24.67
Gen12 Xe - i7-1165G7
SE +/- 0.09, N = 11
73.82
Gen11 - i7-1065G7
SE +/- 0.20, N = 10
48.91
16
32
48
64
80
1. (CXX) g++ options: -rdynamic -lOpenCL
cl-mem 2017-01-13
Benchmark: Copy
GB/s, More Is Better
Gen9 - i7-8565U
SE +/- 0.24, N = 3
21.6
Gen12 Xe - i7-1165G7
SE +/- 0.03, N = 3
48.0
Gen11 - i7-1065G7
SE +/- 0.10, N = 3
35.9
11
22
33
44
55
1. (CC) gcc options: -O2 -flto -lOpenCL

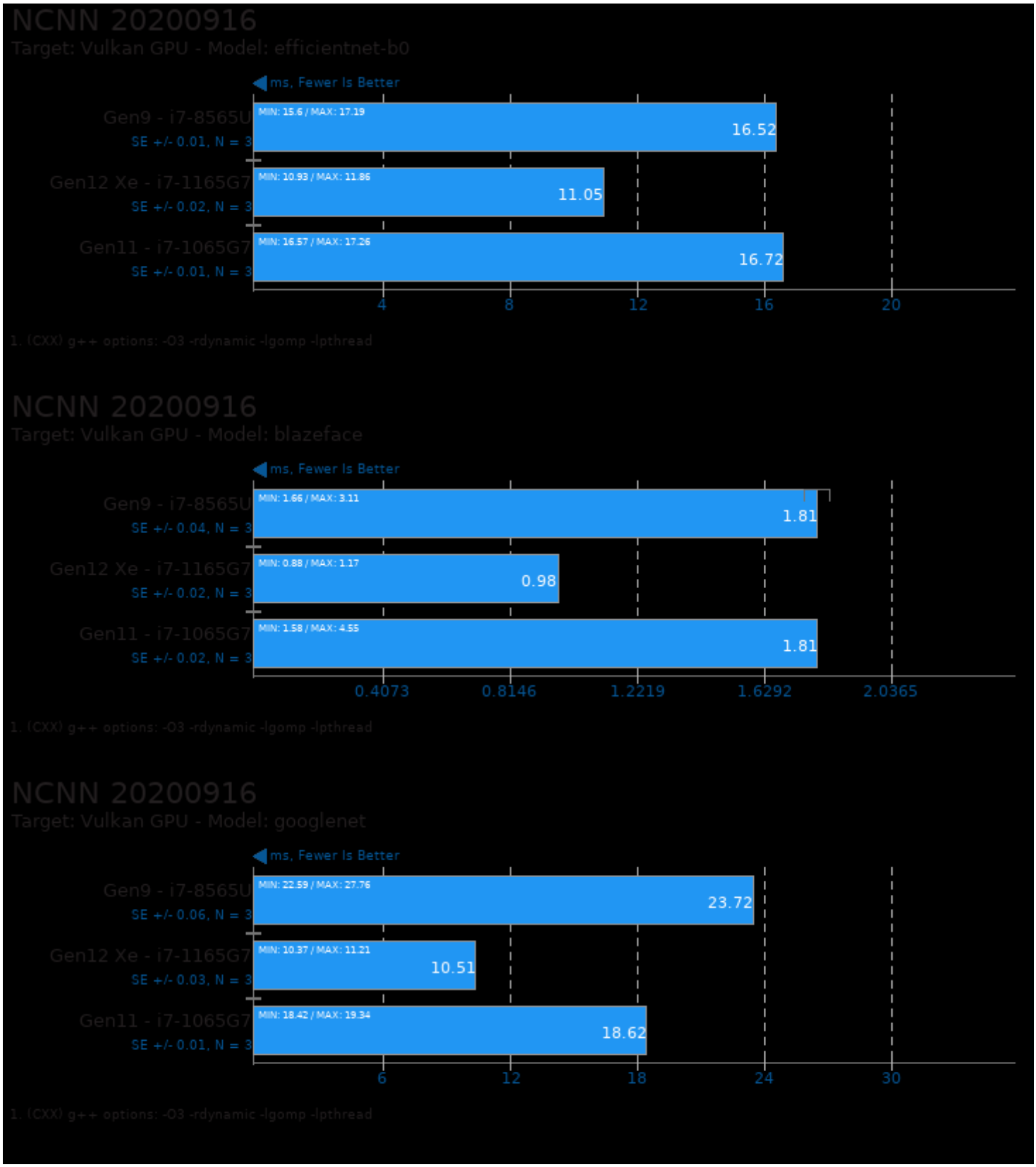
Tigerlake Xe Gen12 to Gen9

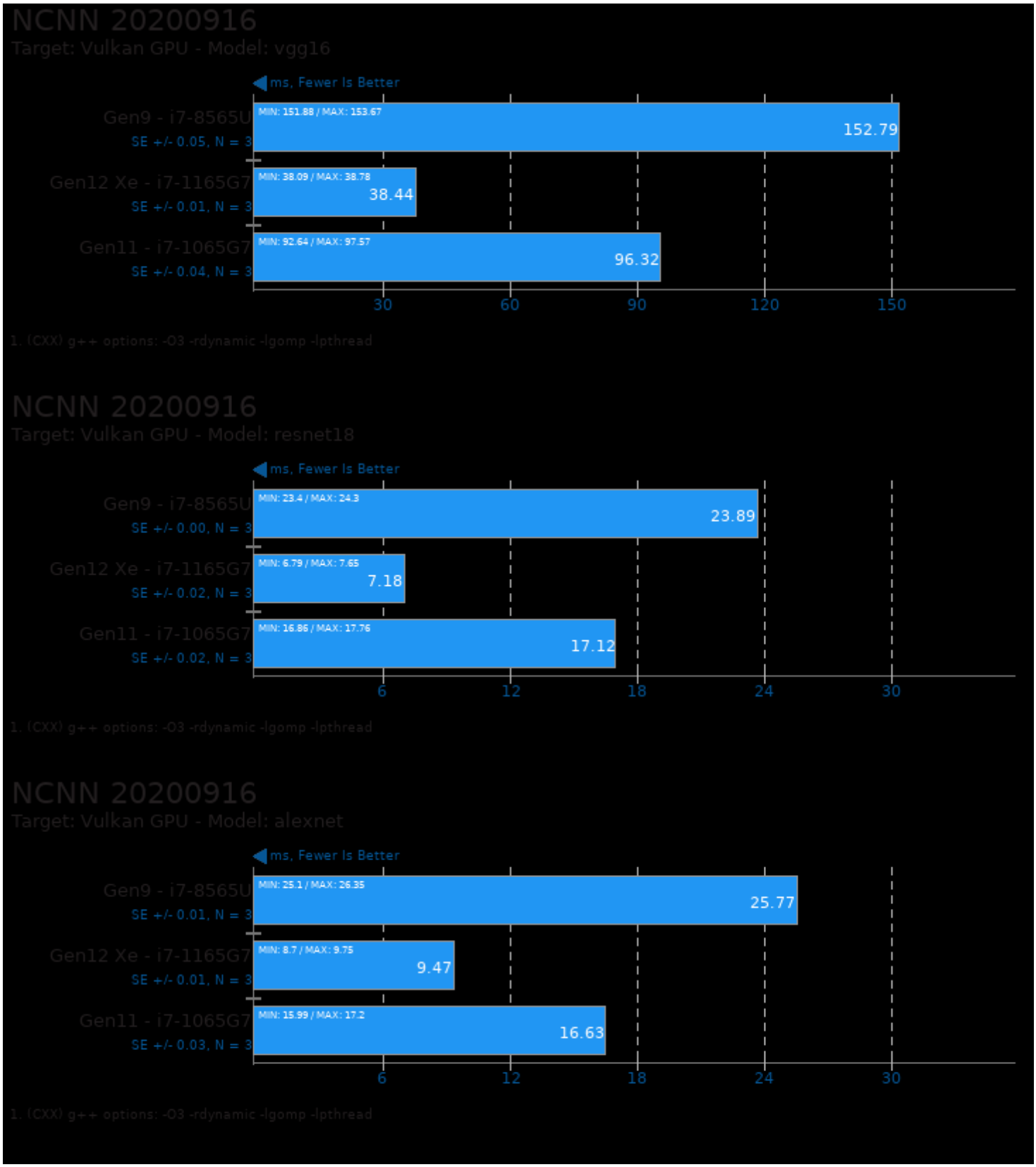


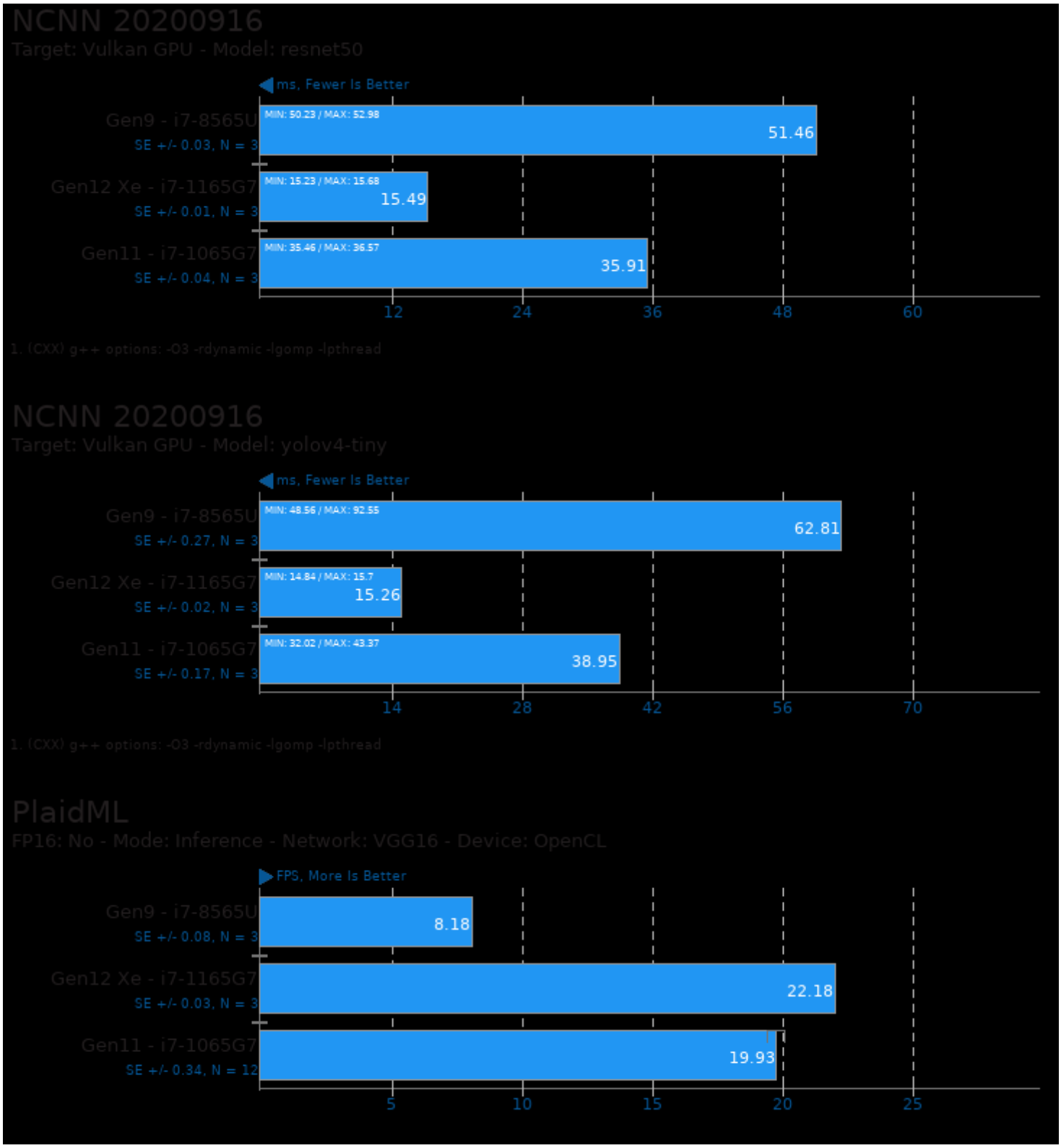

NCNN 20200916
Target: Vulkan GPU - Model: squeezenet
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.06, N = 3
MIN: 27.92 / MAX: 40.05
28.27
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
MIN: 11.25 / MAX: 13.33
11.51
Gen11 - i7-1065G7
SE +/- 0.32, N = 3
MIN: 21.12 / MAX: 29.29
24.65
7
14
21
28
35
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: mobilenet
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.39, N = 3
MIN: 24.44 / MAX: 35.25
25.74
Gen12 Xe - i7-1165G7
SE +/- 0.07, N = 3
MIN: 9.4 / MAX: 29.44
9.74
Gen11 - i7-1065G7
SE +/- 0.20, N = 3
MIN: 19.29 / MAX: 35.76
22.36
6
12
18
24
30
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU-v2-v2 - Model: mobilenet-v2
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.04, N = 3
MIN: 7.97 / MAX: 8.56
8.27
Gen12 Xe - i7-1165G7
SE +/- 0.06, N = 3
MIN: 4 / MAX: 5.44
4.62
Gen11 - i7-1065G7
SE +/- 0.05, N = 3
MIN: 7.07 / MAX: 8.39
7.53
2
4
6
8
10
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

Tigerlake Xe Gen12 to Gen9

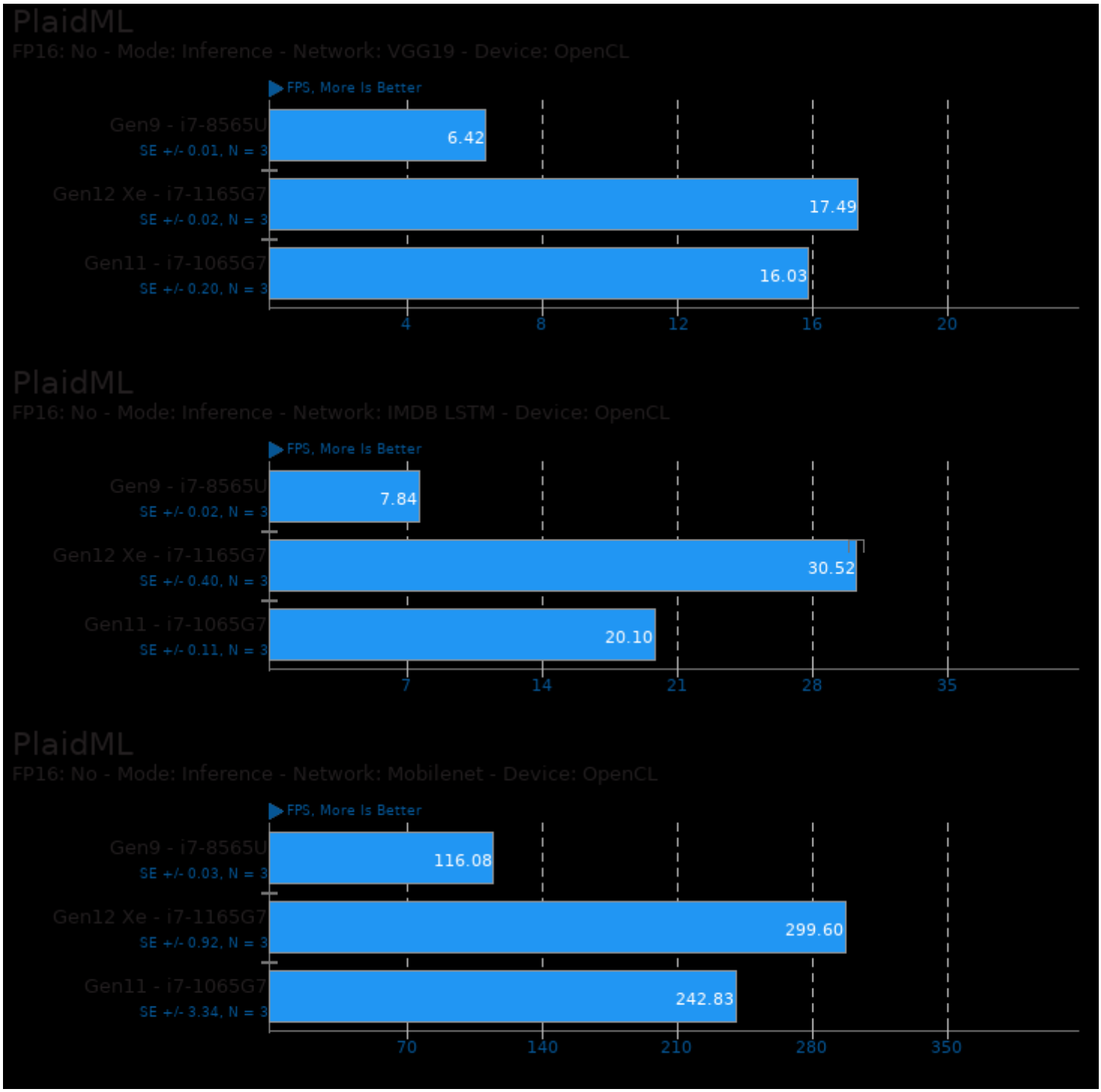



NCNN 20200916
Target: Vulkan GPU - Model: efficientnet-b0
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.01, N = 3
MIN: 15.6 / MAX: 17.19
16.52
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
MIN: 10.93 / MAX: 11.86
11.05
Gen11 - i7-1065G7
SE +/- 0.01, N = 3
MIN: 16.57 / MAX: 17.26
16.72
4
8
12
16
20
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: blazeface
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.04, N = 3
MIN: 1.66 / MAX: 3.11
1.81
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
MIN: 0.88 / MAX: 1.17
0.98
Gen11 - i7-1065G7
SE +/- 0.02, N = 3
MIN: 1.58 / MAX: 4.55
1.81
0.4073
0.8146
1.2219
1.6292
2.0365
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: googlenet
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.06, N = 3
MIN: 22.59 / MAX: 27.76
23.72
Gen12 Xe - i7-1165G7
SE +/- 0.03, N = 3
MIN: 10.37 / MAX: 11.21
10.51
Gen11 - i7-1065G7
SE +/- 0.01, N = 3
MIN: 18.42 / MAX: 19.34
18.62
6
12
18
24
30
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

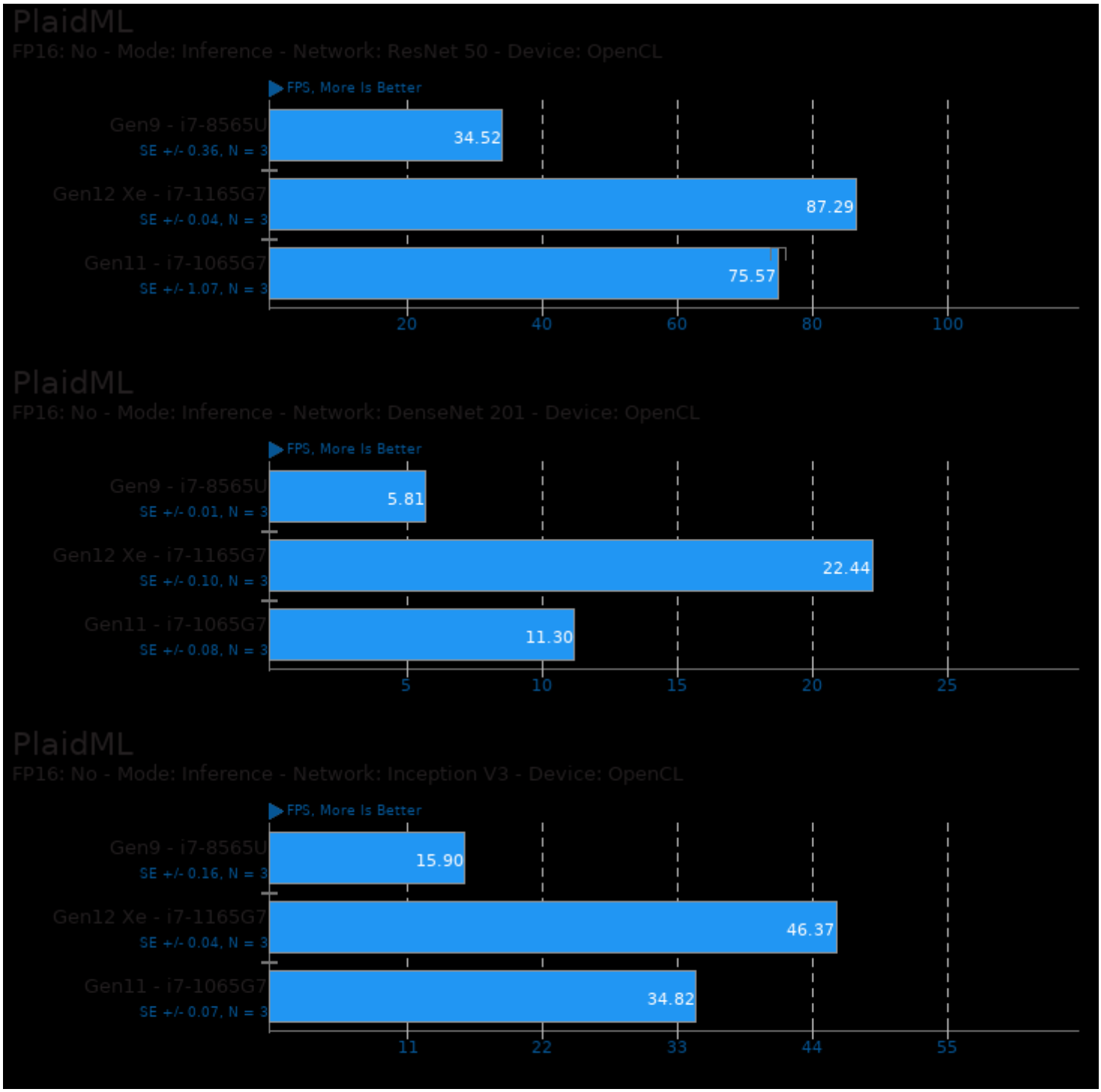

NCNN 20200916
Target: Vulkan GPU - Model: vgg16
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.05, N = 3
MIN: 151.88 / MAX: 153.67
152.79
Gen12 Xe - i7-1165G7
SE +/- 0.01, N = 3
MIN: 38.09 / MAX: 38.78
38.44
Gen11 - i7-1065G7
SE +/- 0.04, N = 3
MIN: 92.64 / MAX: 97.57
96.32
30
60
90
120
150
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: resnet18
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.00, N = 3
MIN: 23.4 / MAX: 24.3
23.89
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
MIN: 6.79 / MAX: 7.65
7.18
Gen11 - i7-1065G7
SE +/- 0.02, N = 3
MIN: 16.86 / MAX: 17.76
17.12
6
12
18
24
30
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: alexnet
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.01, N = 3
MIN: 25.1 / MAX: 26.35
25.77
Gen12 Xe - i7-1165G7
SE +/- 0.01, N = 3
MIN: 8.7 / MAX: 9.75
9.47
Gen11 - i7-1065G7
SE +/- 0.03, N = 3
MIN: 15.99 / MAX: 17.2
16.63
6
12
18
24
30
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread

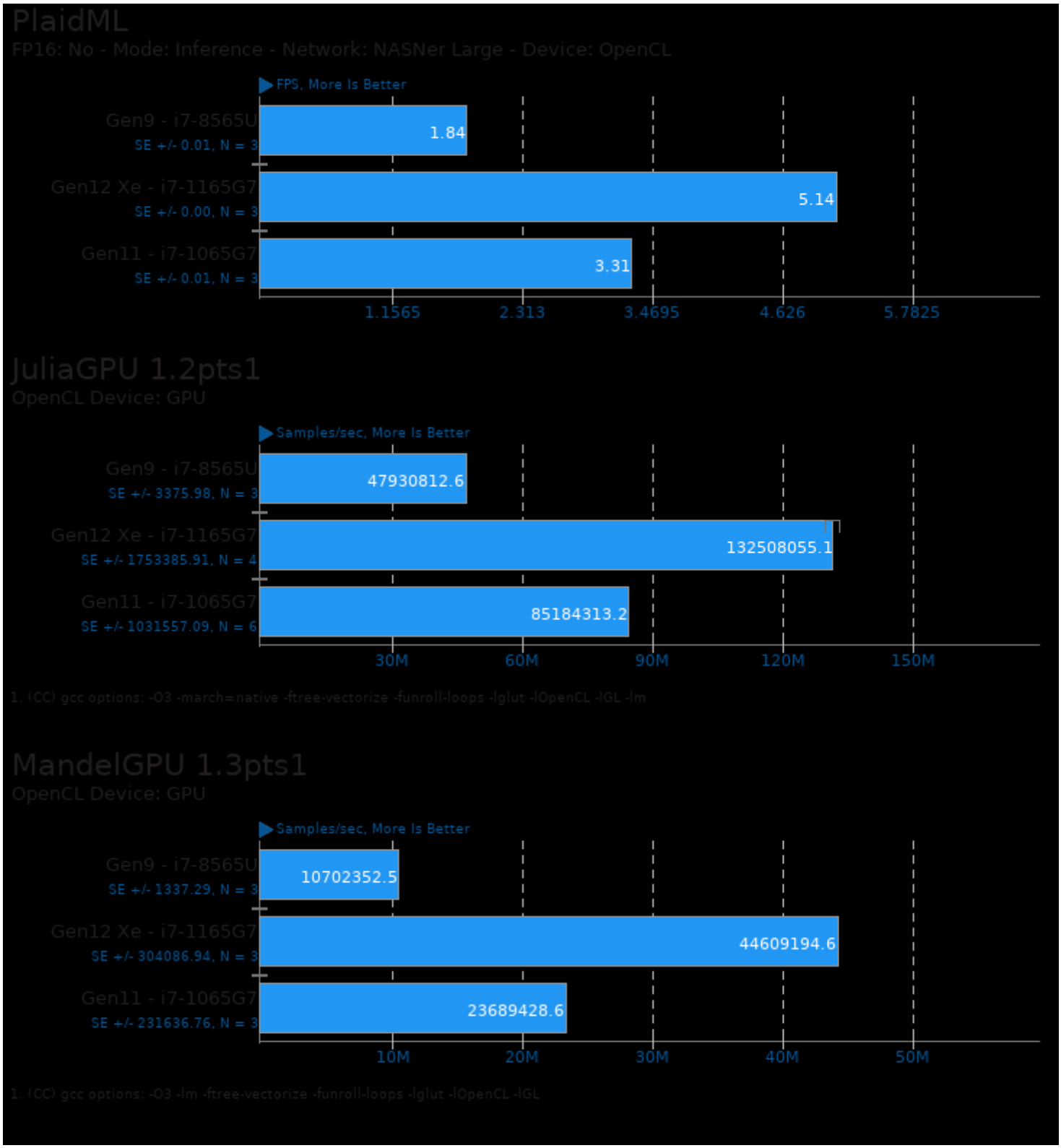

NCNN 20200916
Target: Vulkan GPU - Model: resnet50
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.03, N = 3
MIN: 50.23 / MAX: 52.98
51.46
Gen12 Xe - i7-1165G7
SE +/- 0.01, N = 3
MIN: 15.23 / MAX: 15.68
15.49
Gen11 - i7-1065G7
SE +/- 0.04, N = 3
MIN: 35.46 / MAX: 36.57
35.91
12
24
36
48
60
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
NCNN 20200916
Target: Vulkan GPU - Model: yolov4-tiny
ms, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.27, N = 3
MIN: 48.56 / MAX: 92.55
62.81
Gen12 Xe - i7-1165G7
SE +/- 0.02, N = 3
MIN: 14.84 / MAX: 15.7
15.26
Gen11 - i7-1065G7
SE +/- 0.17, N = 3
MIN: 32.02 / MAX: 43.37
38.95
14
28
42
56
70
1. (CXX) g++ options: -O3 -rdynamic -lgomp -lpthread
PlaidML
FP16: No - Mode: Inference - Network: VGG16 - Device: OpenCL
FPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.08, N = 3
8.18
Gen12 Xe - i7-1165G7
SE +/- 0.03, N = 3
22.18
Gen11 - i7-1065G7
SE +/- 0.34, N = 12
19.93
5
10
15
20
25

Tigerlake Xe Gen12 to Gen9

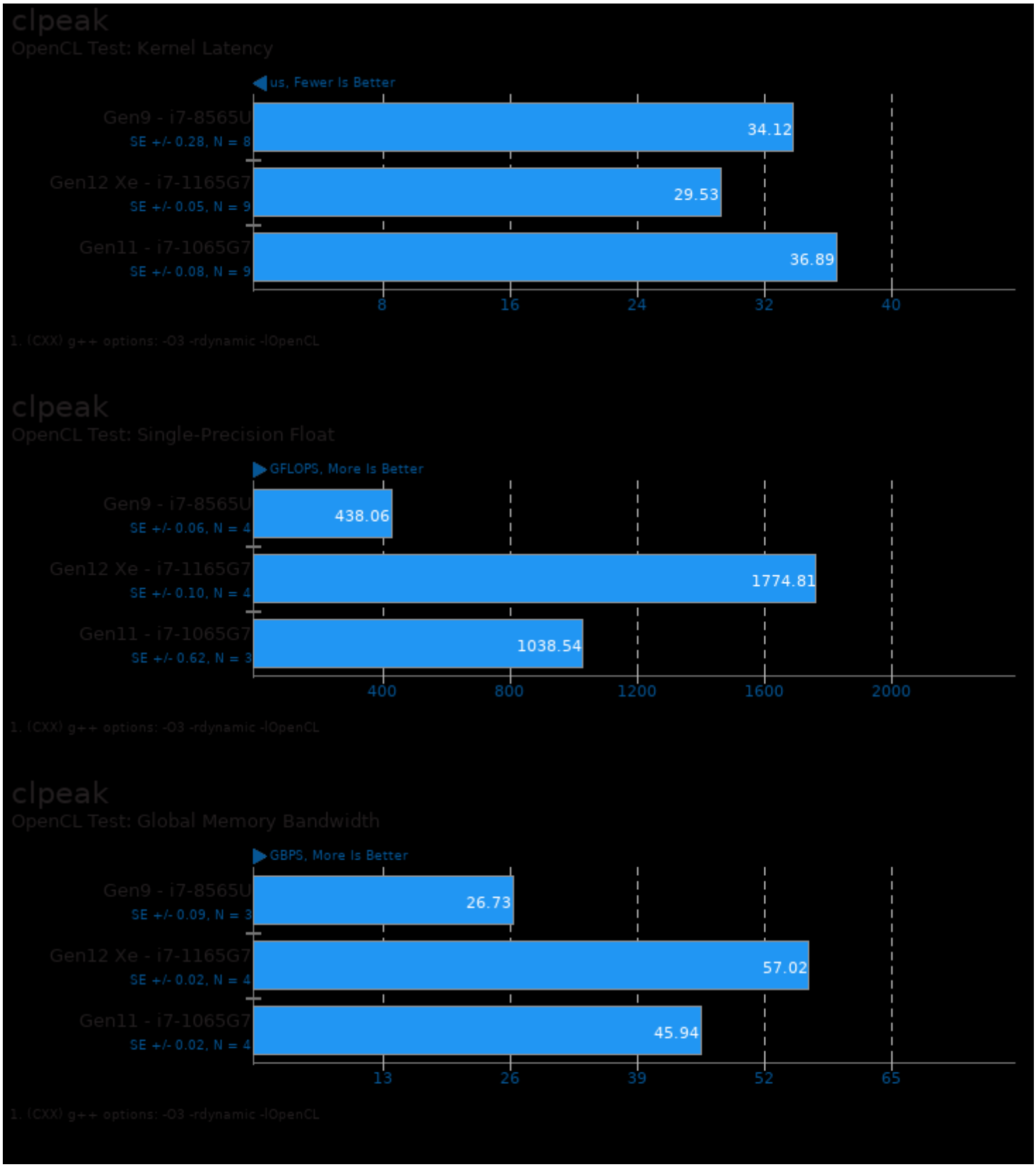


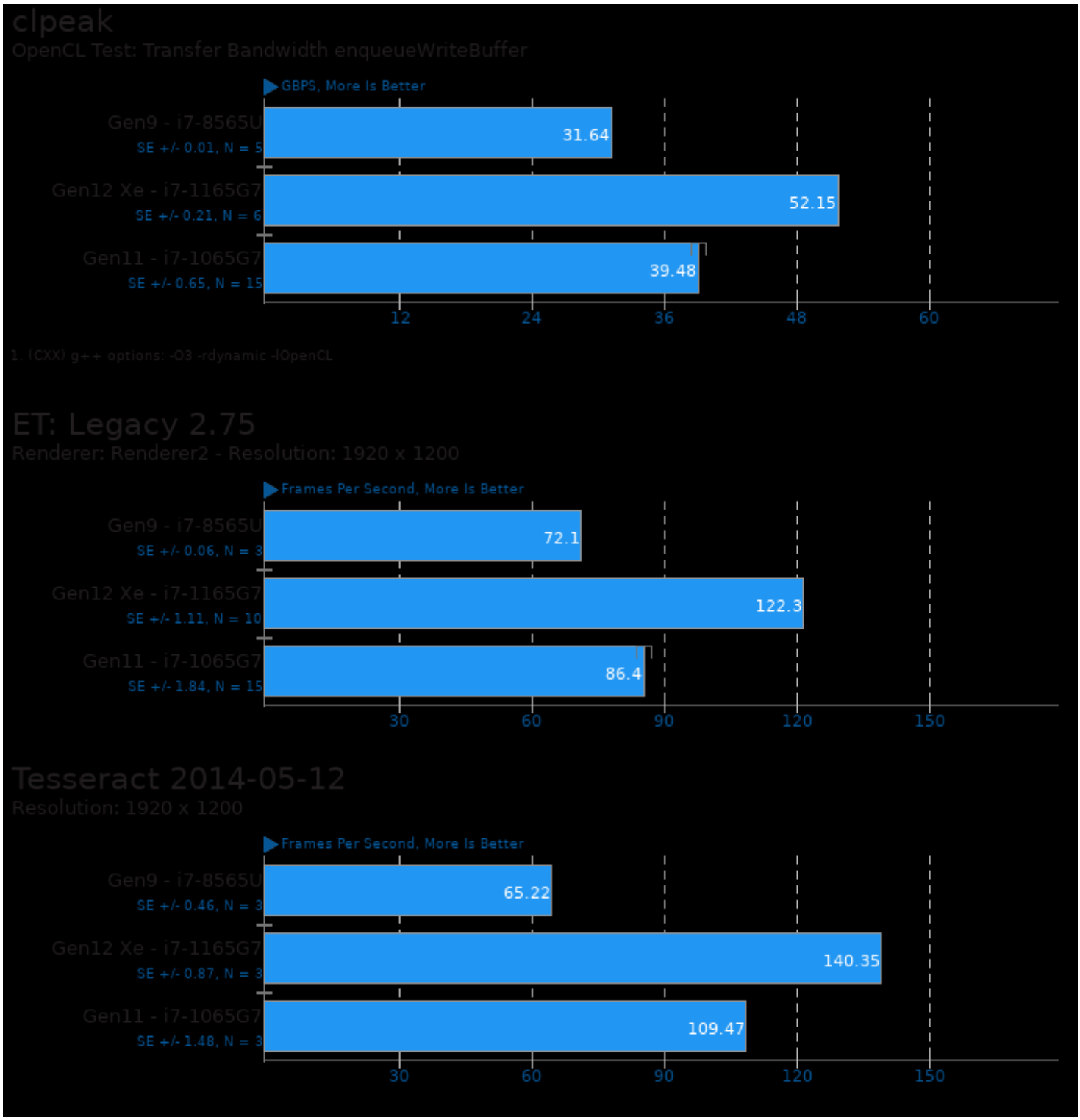
Tigerlake Xe Gen12 to Gen9



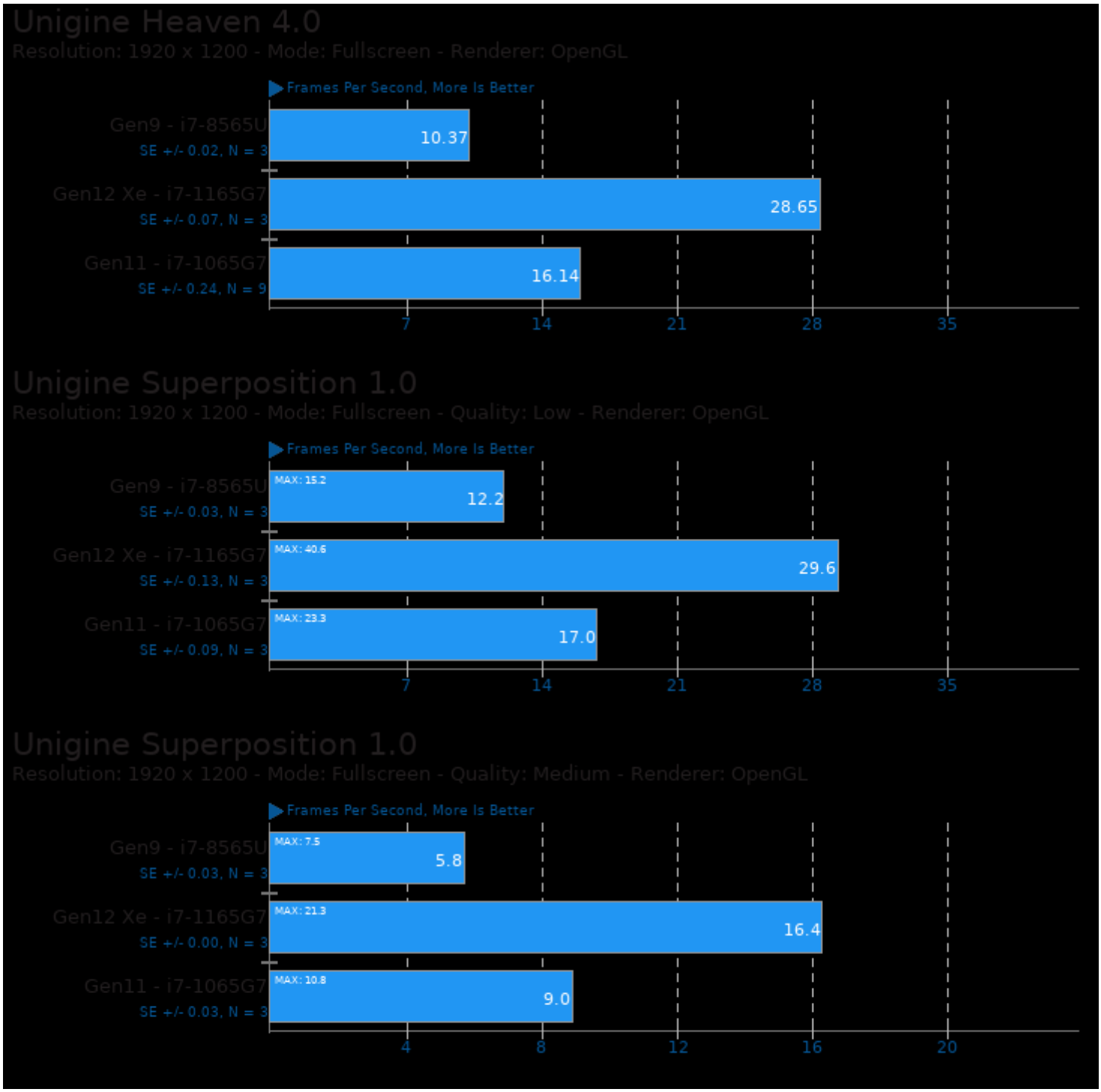

PlaidML
FP16: No - Mode: Inference - Network: NASNer Large - Device: OpenCL
FPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.01, N = 3
1.84
Gen12 Xe - i7-1165G7
SE +/- 0.00, N = 3
5.14
Gen11 - i7-1065G7
SE +/- 0.01, N = 3
3.31
1.1565
2.313
3.4695
4.626
5.7825
JuliaGPU 1.2pts1
OpenCL Device: GPU
Samples/sec, More Is Better
Gen9 - i7-8565U
SE +/- 3375.98, N = 3
47930812.6
Gen12 Xe - i7-1165G7
SE +/- 1753385.91, N = 4
132508055.1
Gen11 - i7-1065G7
SE +/- 1031557.09, N = 6
85184313.2
30M
60M
90M
120M
150M
1. (CC) gcc options: -O3 -march=native -ftree-vectorize -funroll-loops -lglut -lOpenCL -lGL -lm
MandelGPU 1.3pts1
OpenCL Device: GPU
Samples/sec, More Is Better
Gen9 - i7-8565U
SE +/- 1337.29, N = 3
10702352.5
Gen12 Xe - i7-1165G7
SE +/- 304086.94, N = 3
44609194.6
Gen11 - i7-1065G7
SE +/- 231636.76, N = 3
23689428.6
10M
20M
30M
40M
50M
1. (CC) gcc options: -O3 -lm -ftree-vectorize -funroll-loops -lglut -lOpenCL -lGL

Tigerlake Xe Gen12 to Gen9

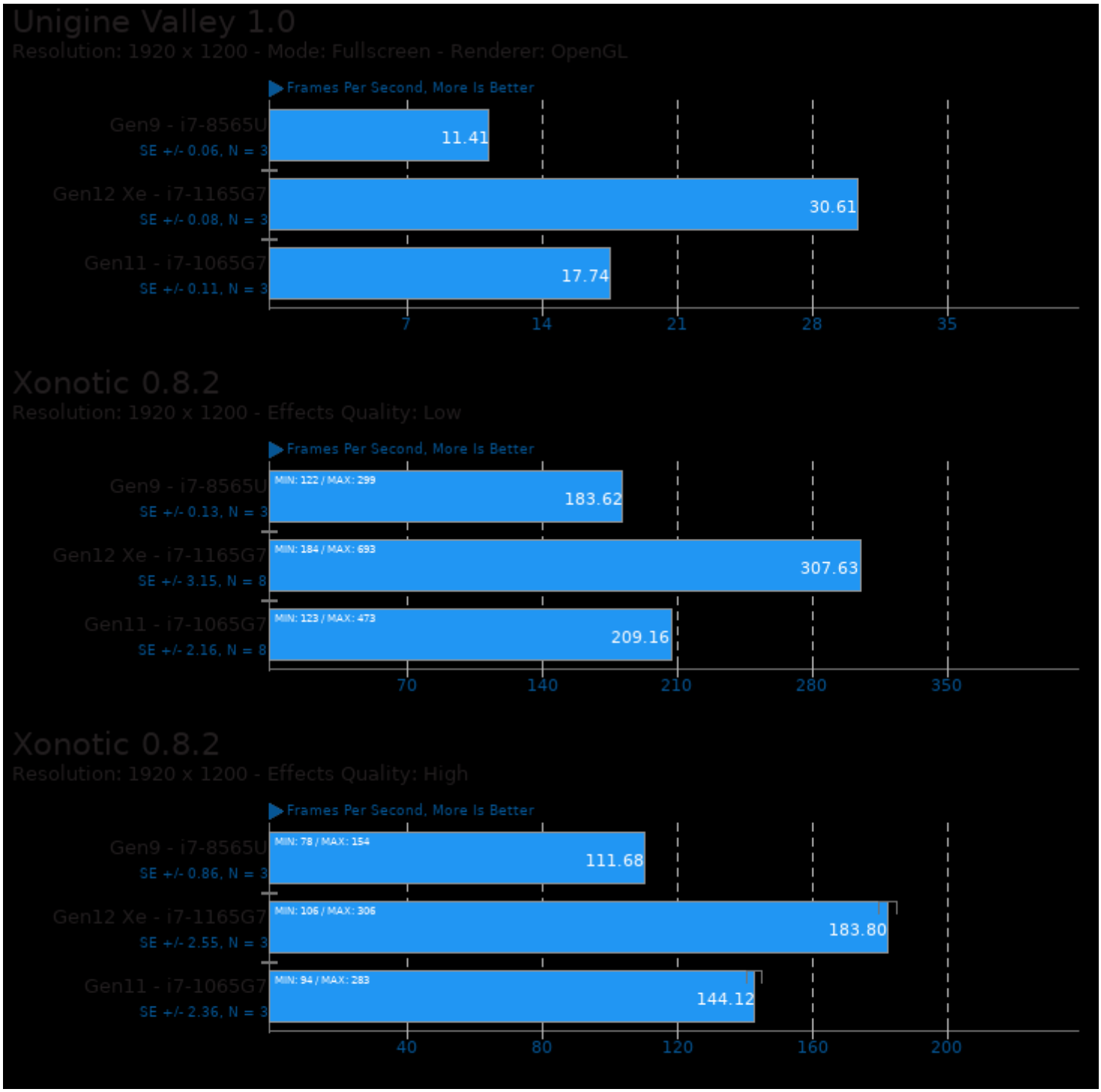



clpeak
OpenCL Test: Transfer Bandwidth enqueueWriteBuffer
GBPS, More Is Better
Gen9 - i7-8565U
SE +/- 0.01, N = 5
31.64
Gen12 Xe - i7-1165G7
SE +/- 0.21, N = 6
52.15
Gen11 - i7-1065G7
SE +/- 0.65, N = 15
39.48
12
24
36
48
60
1. (CXX) g++ options: -O3 -rdynamic -lOpenCL
ET: Legacy 2.75
Renderer: Renderer2 - Resolution: 1920 x 1200
Frames Per Second, More Is Better
Gen9 - i7-8565U
SE +/- 0.06, N = 3
72.1
Gen12 Xe - i7-1165G7
SE +/- 1.11, N = 10
122.3
Gen11 - i7-1065G7
SE +/- 1.84, N = 15
86.4
30
60
90
120
150
Tesseract 2014-05-12
Resolution: 1920 x 1200
Frames Per Second, More Is Better
Gen9 - i7-8565U
SE +/- 0.46, N = 3
65.22
Gen12 Xe - i7-1165G7
SE +/- 0.87, N = 3
140.35
Gen11 - i7-1065G7
SE +/- 1.48, N = 3
109.47
30
60
90
120
150

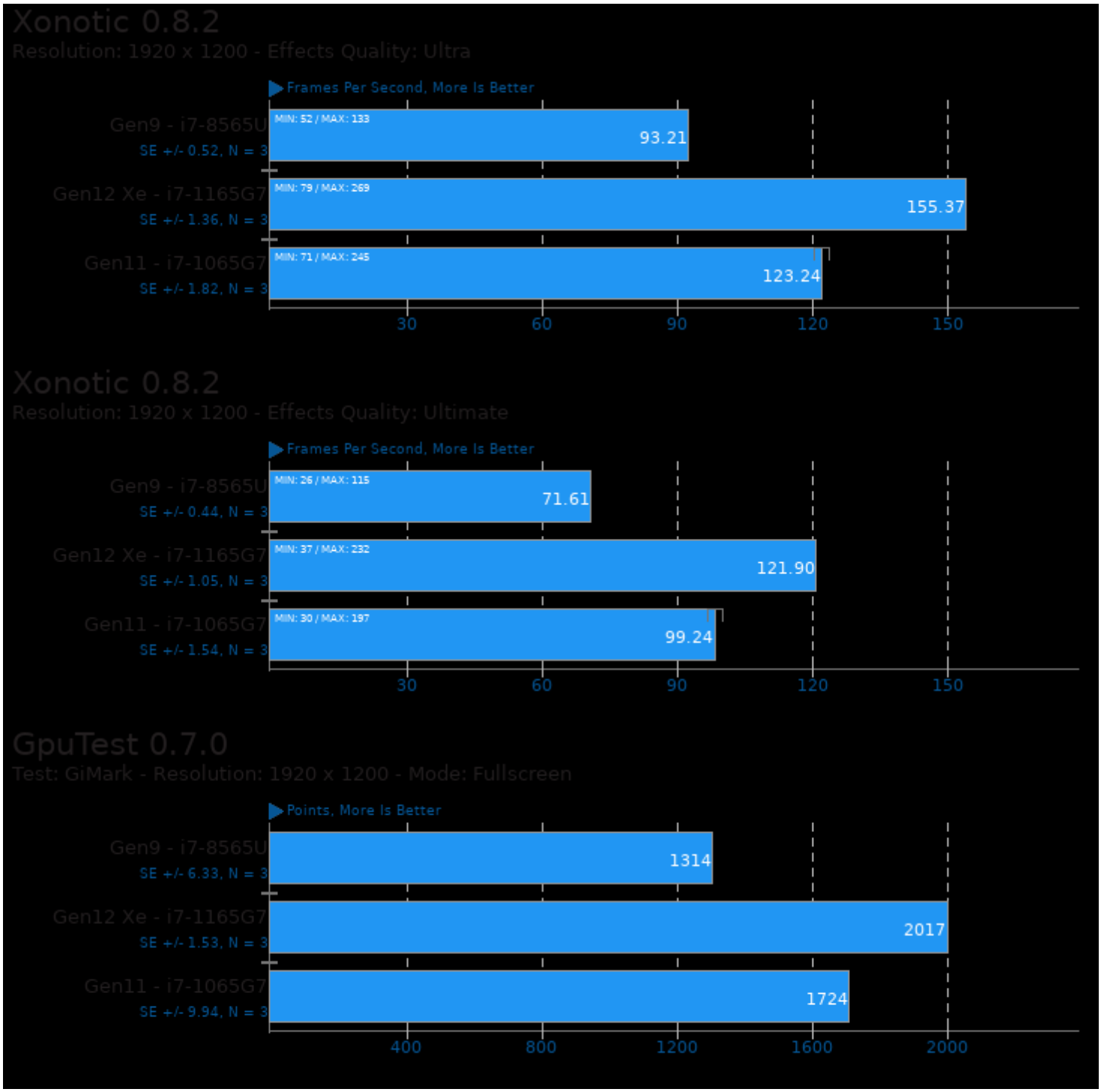
Tigerlake Xe Gen12 to Gen9



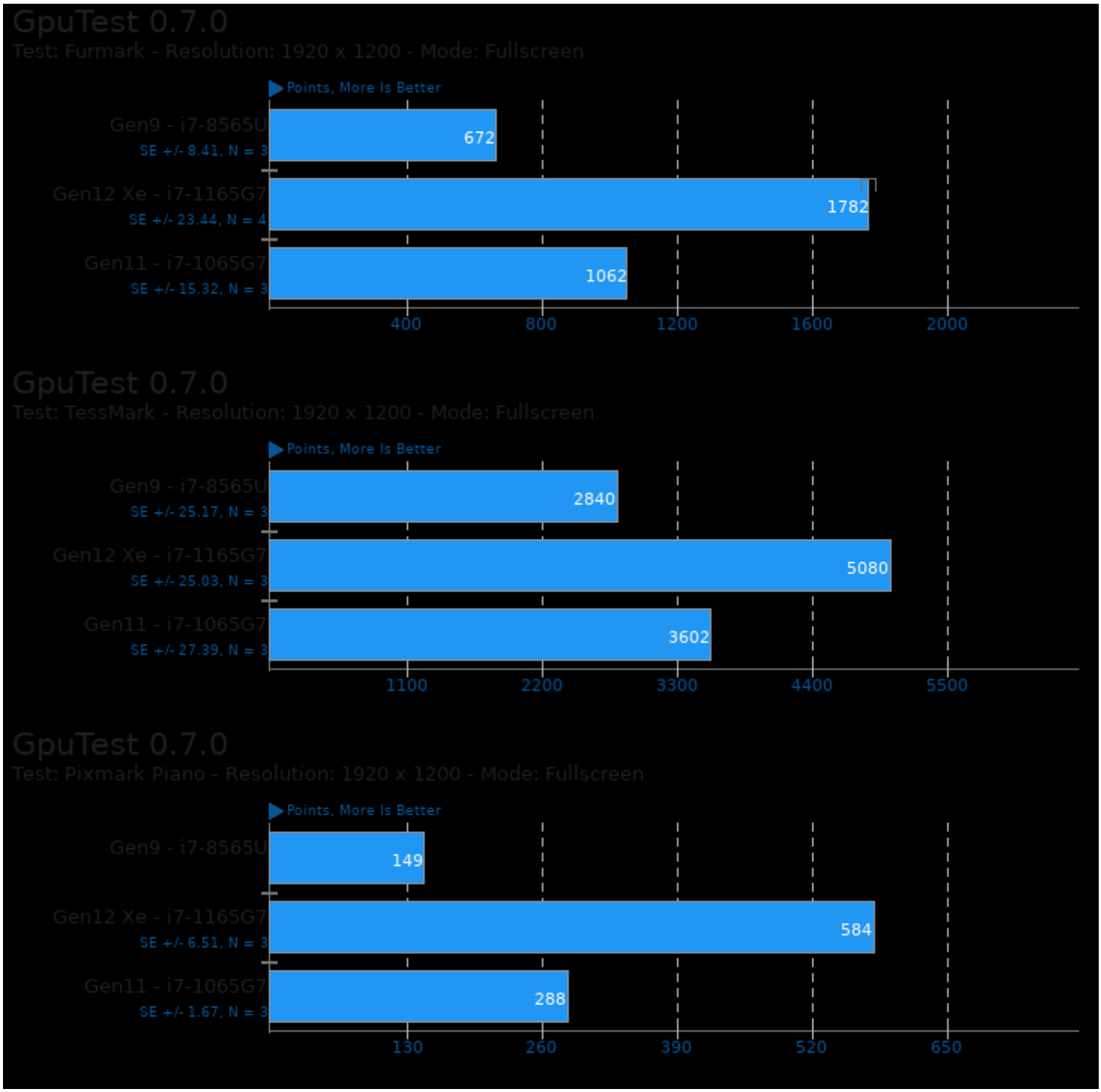
Tigerlake Xe Gen12 to Gen9

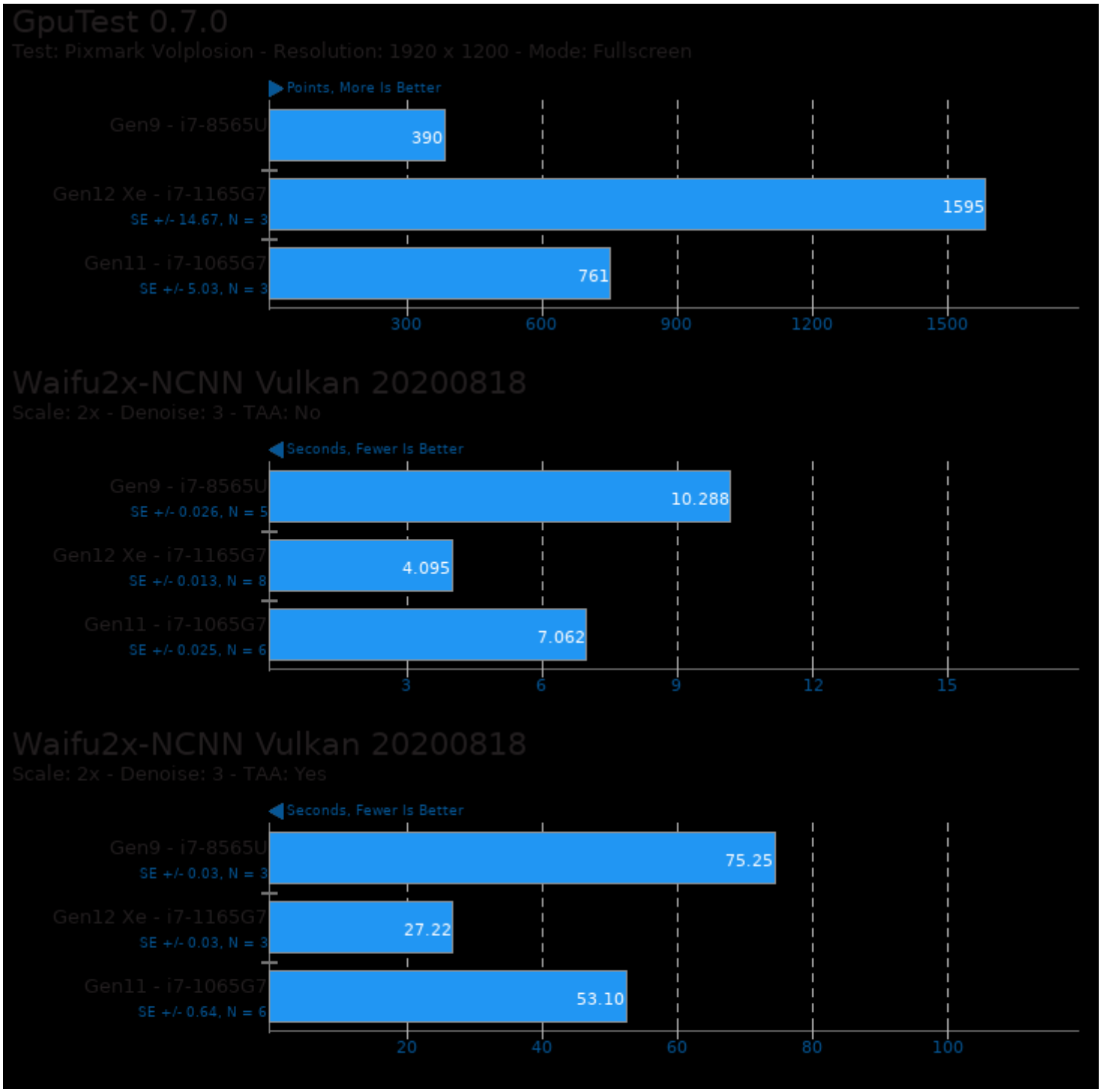


Tigerlake Xe Gen12 to Gen9

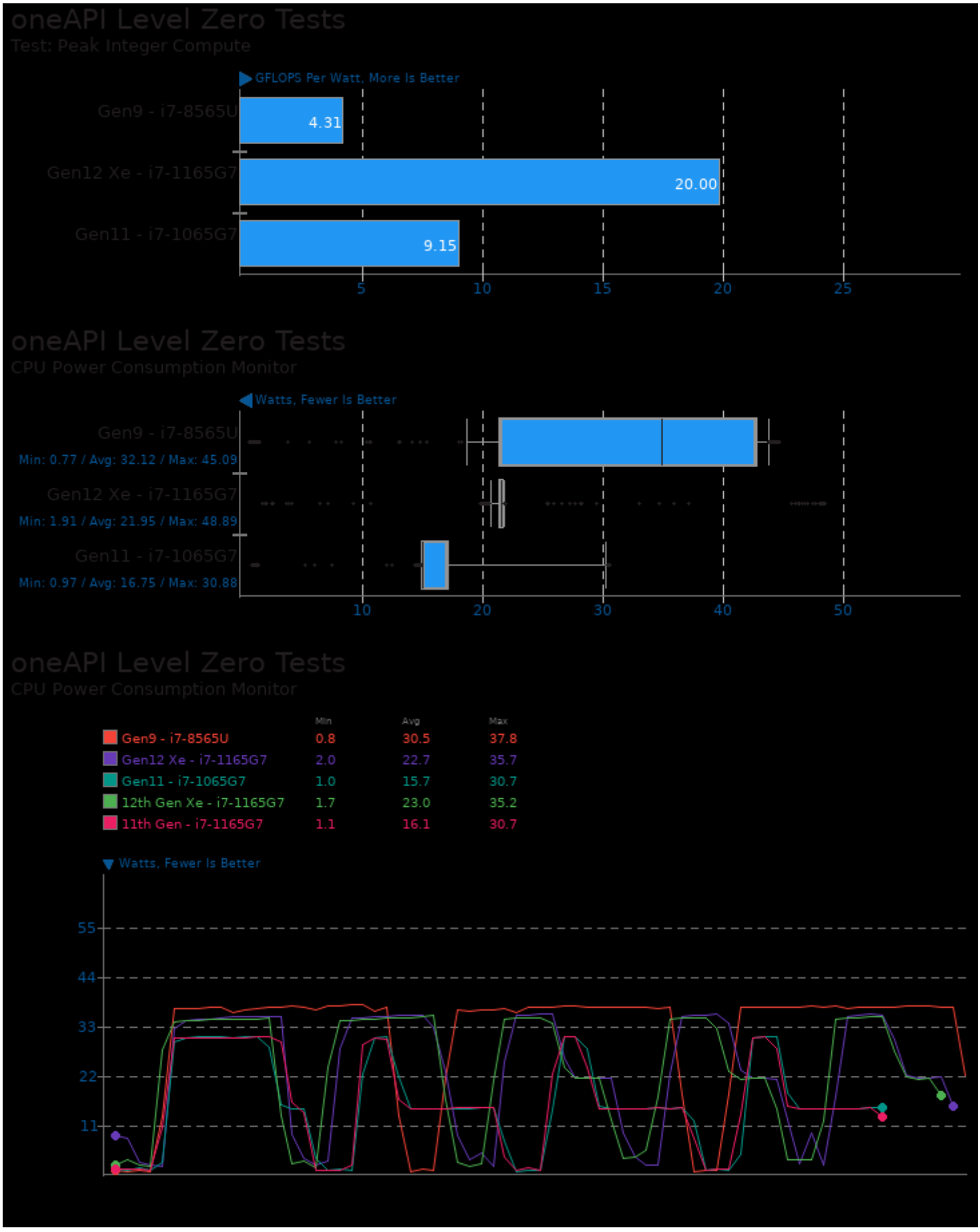


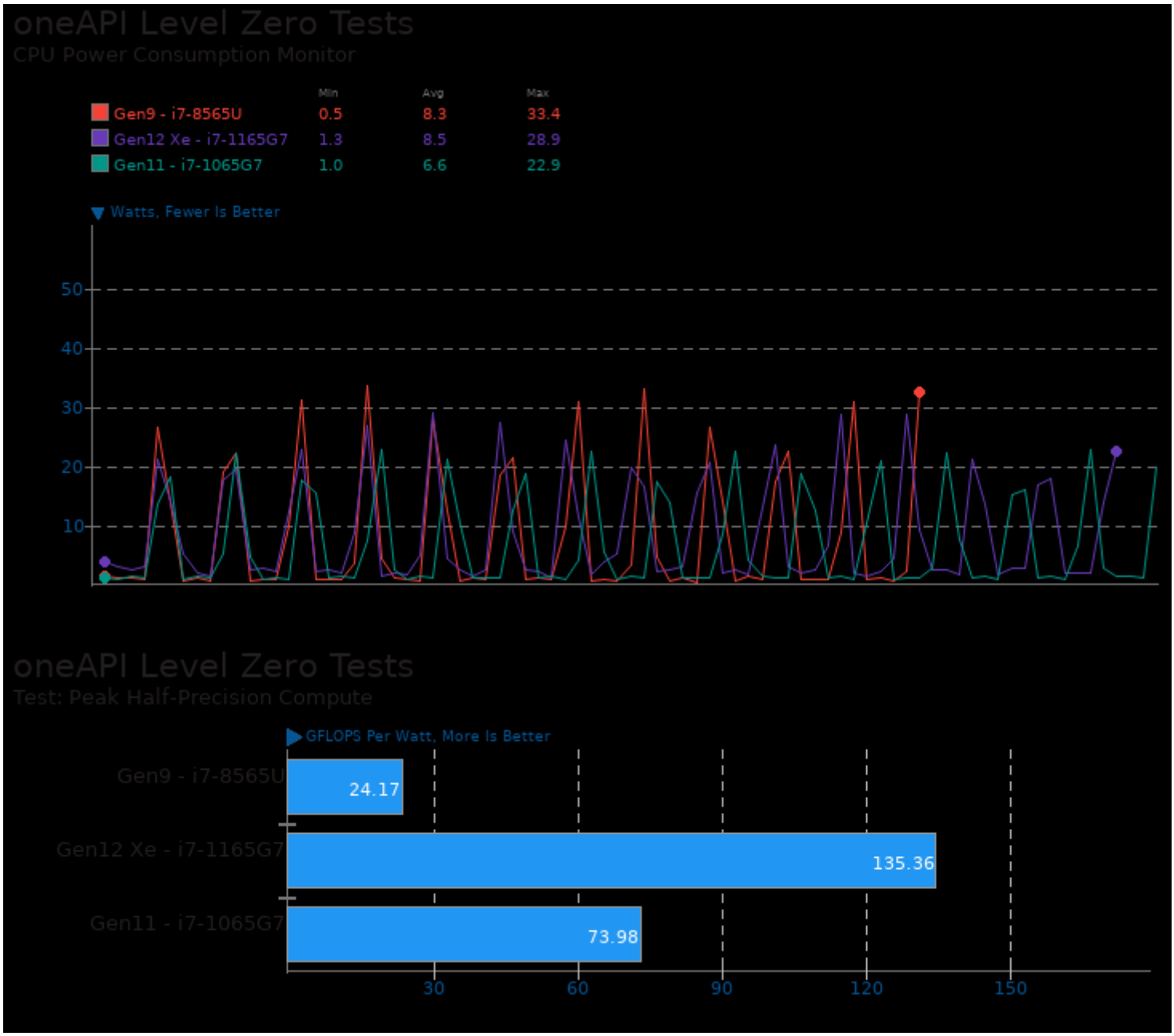
Tigerlake Xe Gen12 to Gen9



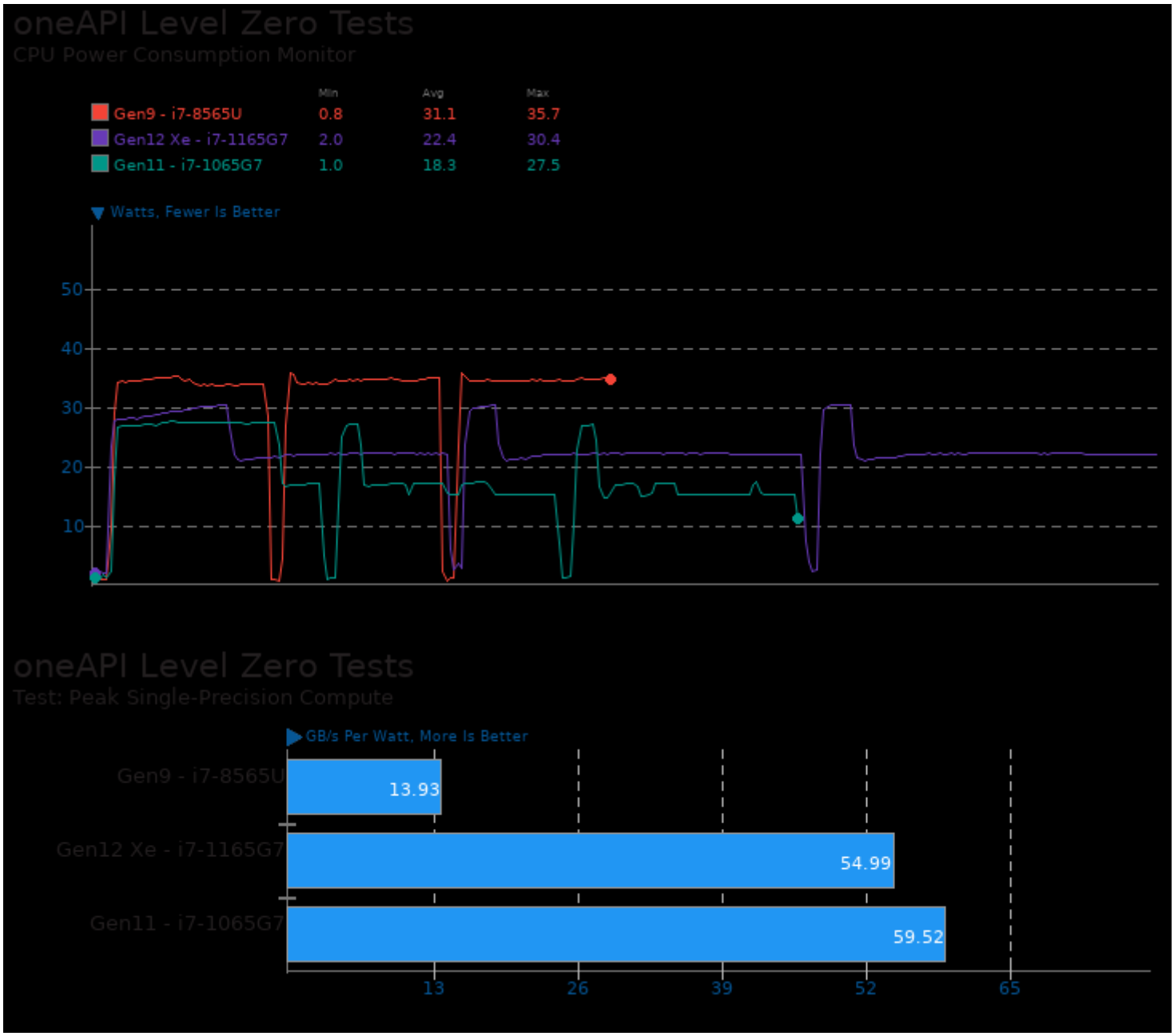

GpuTest 0.7.0
Test: Pixmark Volplosion - Resolution: 1920 x 1200 - Mode: Fullscreen
Points, More Is Better
Gen9 - i7-8565U
390
Gen12 Xe - i7-1165G7
SE +/- 14.67, N = 3
1595
Gen11 - i7-1065G7
SE +/- 5.03, N = 3
761
300
600
900
1200
1500
Waifu2x-NCNN Vulkan 20200818
Scale: 2x - Denoise: 3 - TAA: No
Seconds, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.026, N = 5
10.288
Gen12 Xe - i7-1165G7
SE +/- 0.013, N = 8
4.095
Gen11 - i7-1065G7
SE +/- 0.025, N = 6
7.062
3
6
9
12
15
Waifu2x-NCNN Vulkan 20200818
Scale: 2x - Denoise: 3 - TAA: Yes
Seconds, Fewer Is Better
Gen9 - i7-8565U
SE +/- 0.03, N = 3
75.25
Gen12 Xe - i7-1165G7
SE +/- 0.03, N = 3
27.22
Gen11 - i7-1065G7
SE +/- 0.64, N = 6
53.10
20
40
60
80
100

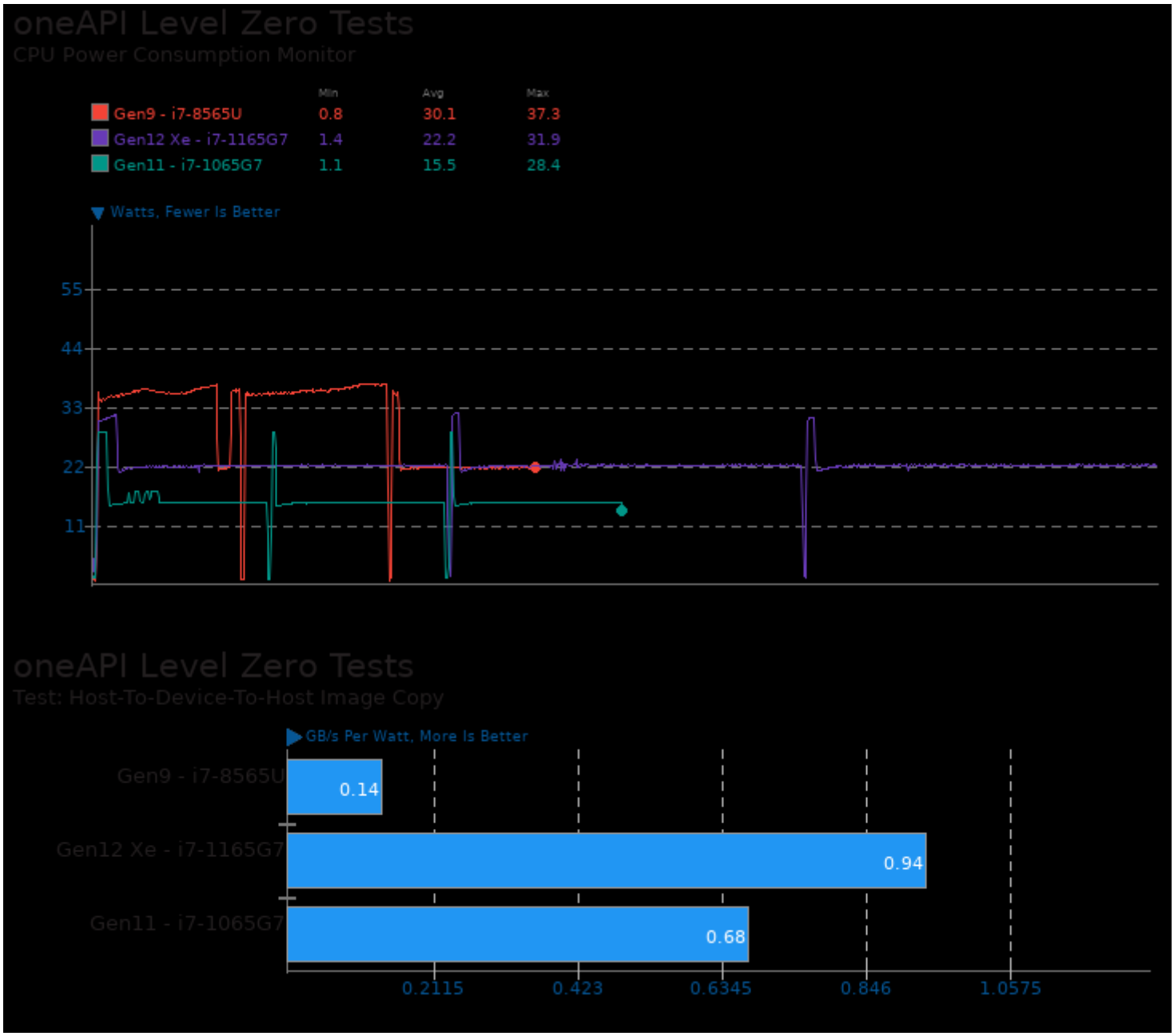
Tigerlake Xe Gen12 to Gen9



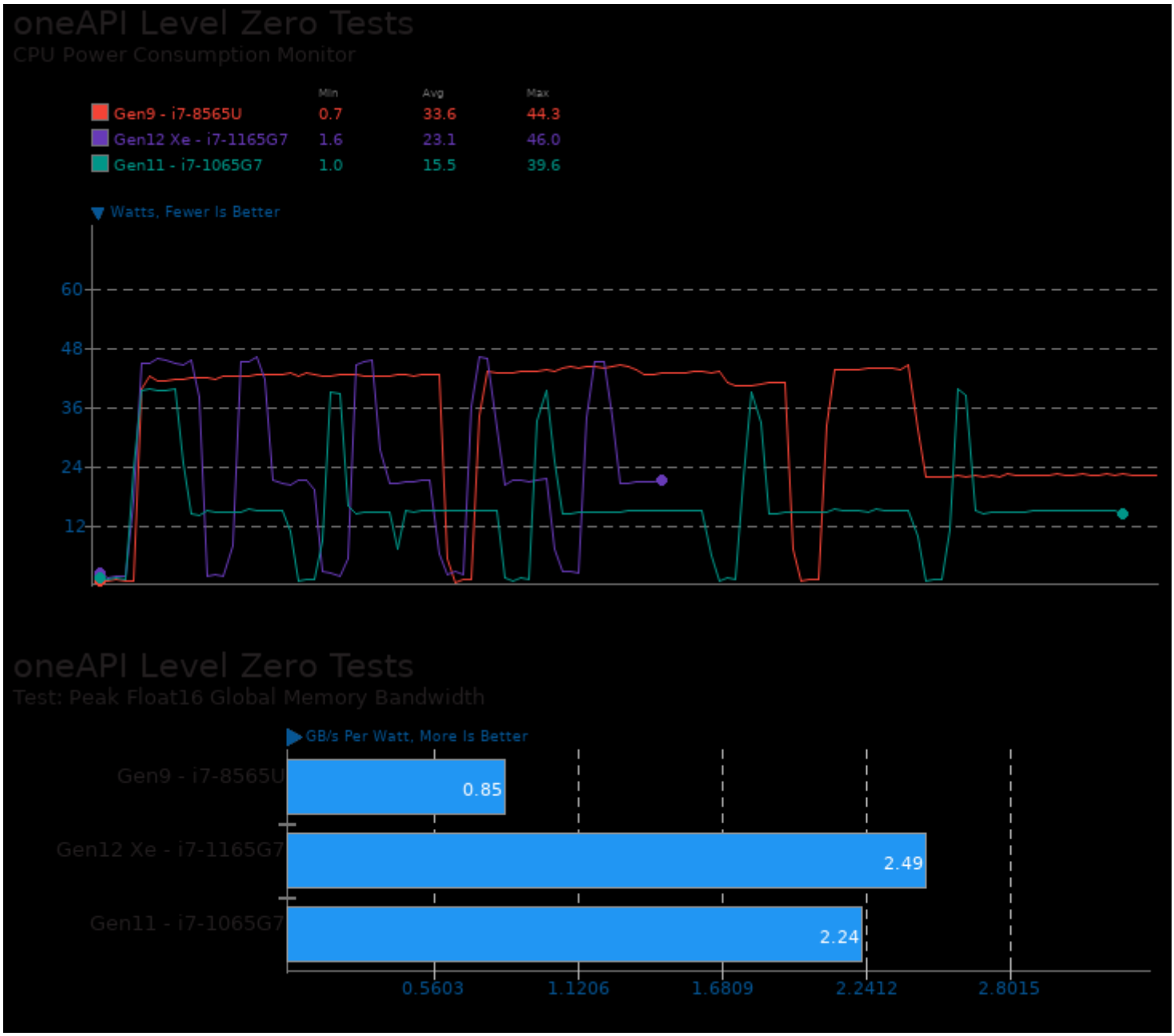

oneAPI Level Zero Tests
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
0.5
8.3
33.4
Gen12 Xe - i7-1165G7
1.3
8.5
28.9
Gen11 - i7-1065G7
1.0
6.6
22.9
Watts, Fewer Is Better
50
40
30
20
10
oneAPI Level Zero Tests
Test: Peak Half-Precision Compute
GFLOPS Per Watt, More Is Better
Gen9 - i7-8565U
24.17
Gen12 Xe - i7-1165G7
135.36
Gen11 - i7-1065G7
73.98
30
60
90
120
150

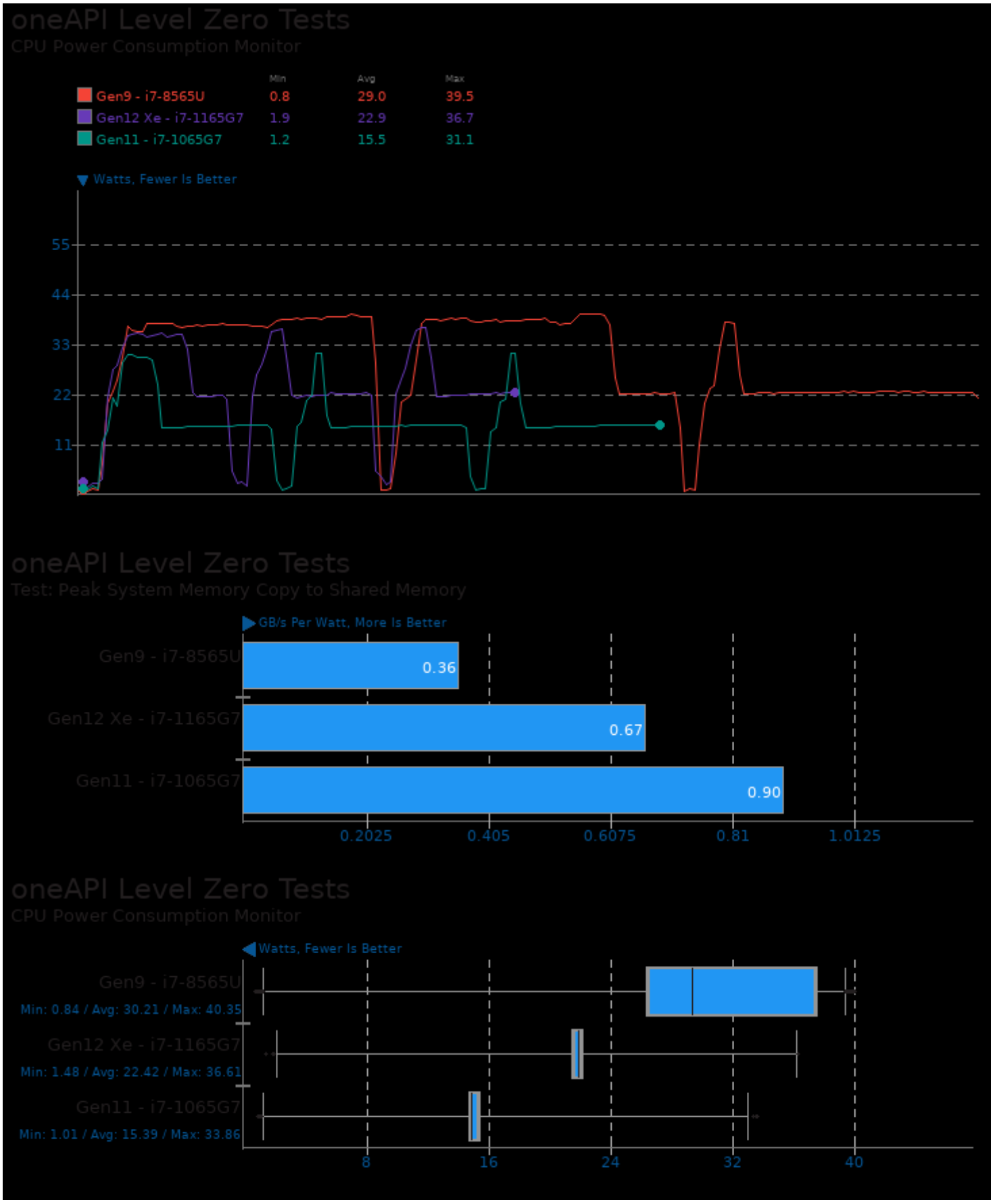
Tigerlake Xe Gen12 to Gen9

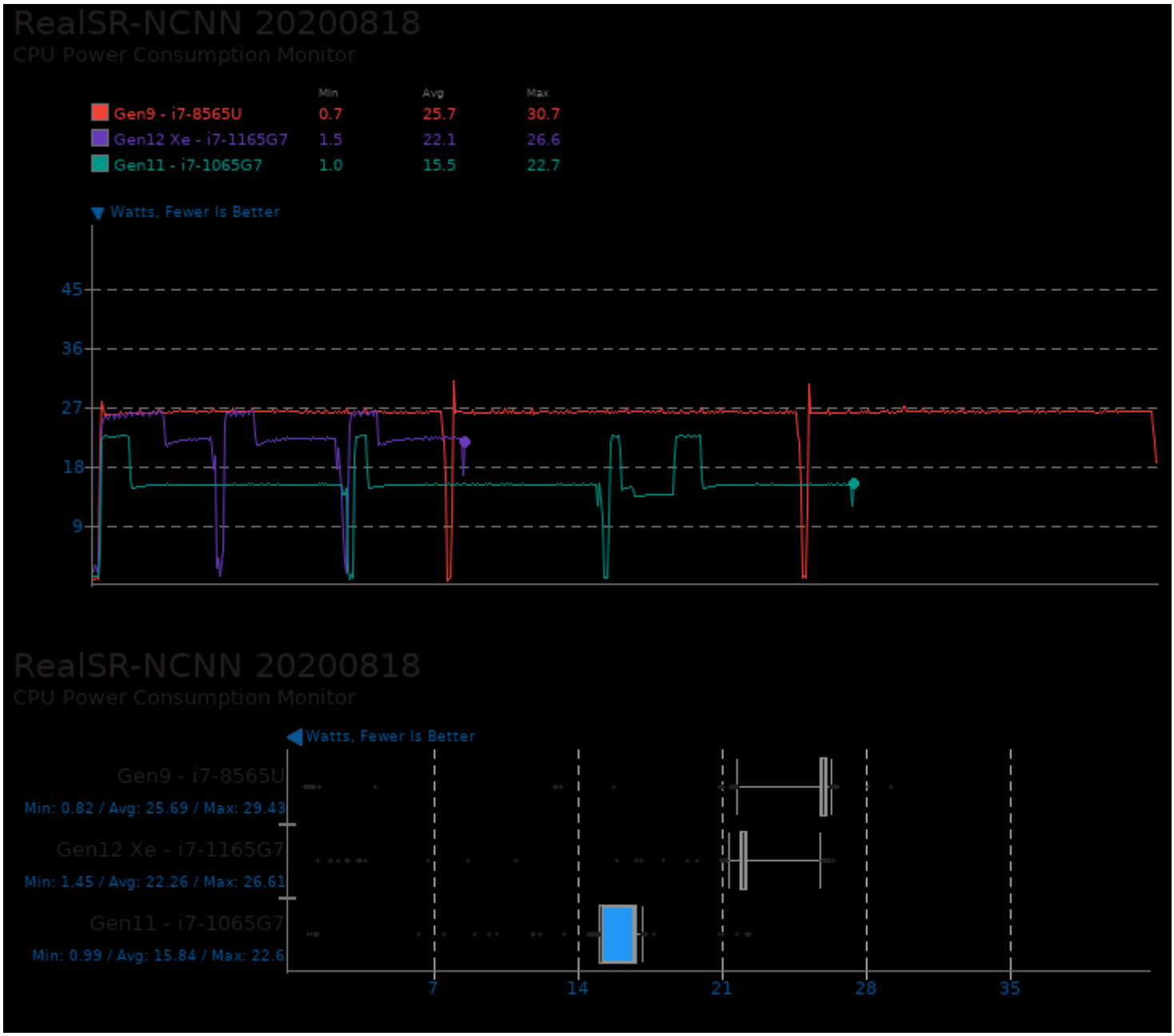


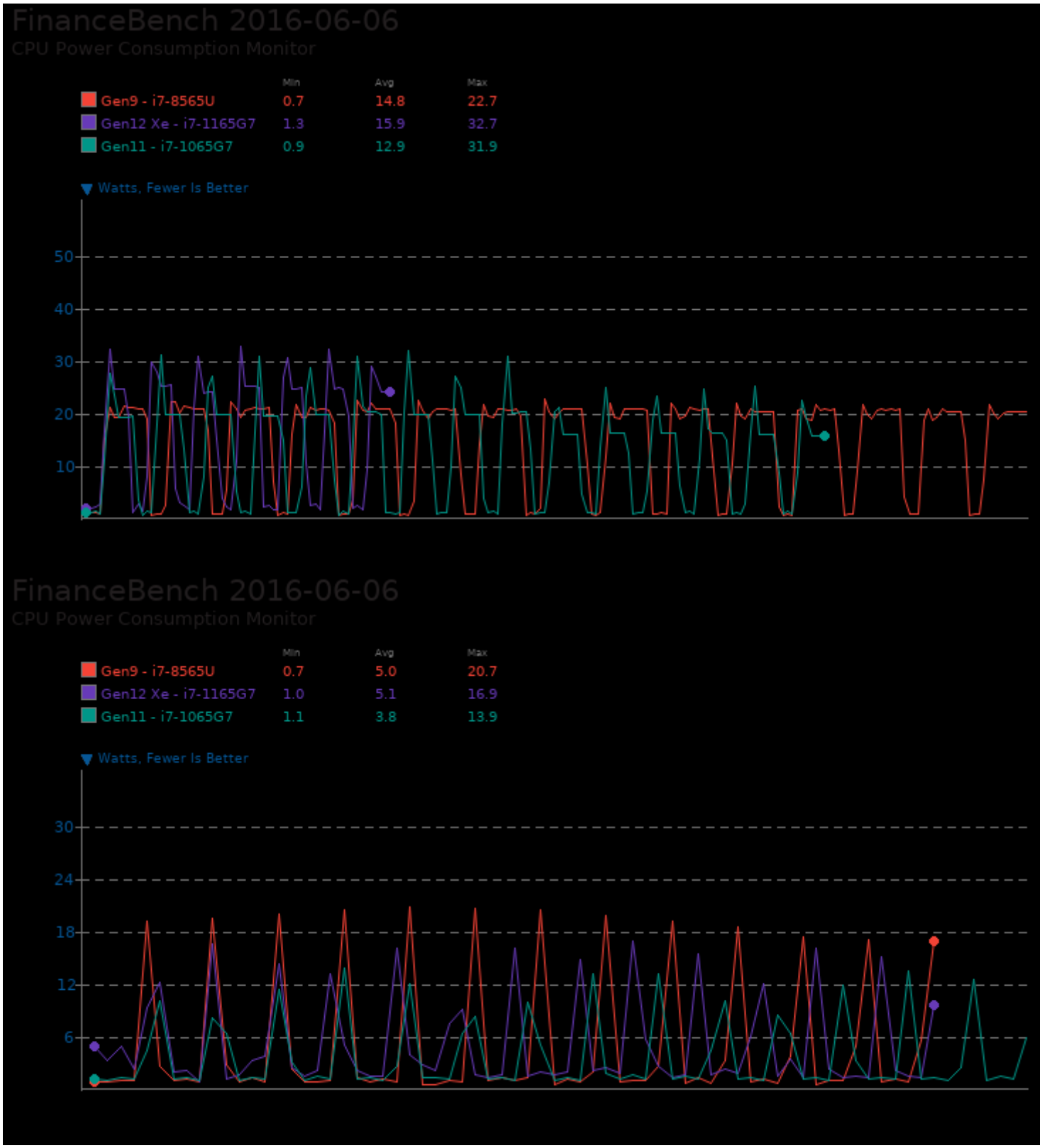

oneAPI Level Zero Tests
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
0.8
30.1
37.3
Gen12 Xe - i7-1165G7
1.4
22.2
31.9
Gen11 - i7-1065G7
1.1
15.5
28.4
Watts, Fewer Is Better
55
44
33
22
11
oneAPI Level Zero Tests
Test: Host-To-Device-To-Host Image Copy
GB/s Per Watt, More Is Better
Gen9 - i7-8565U
0.14
Gen12 Xe - i7-1165G7
0.94
Gen11 - i7-1065G7
0.68
0.2115
0.423
0.6345
0.846
1.0575

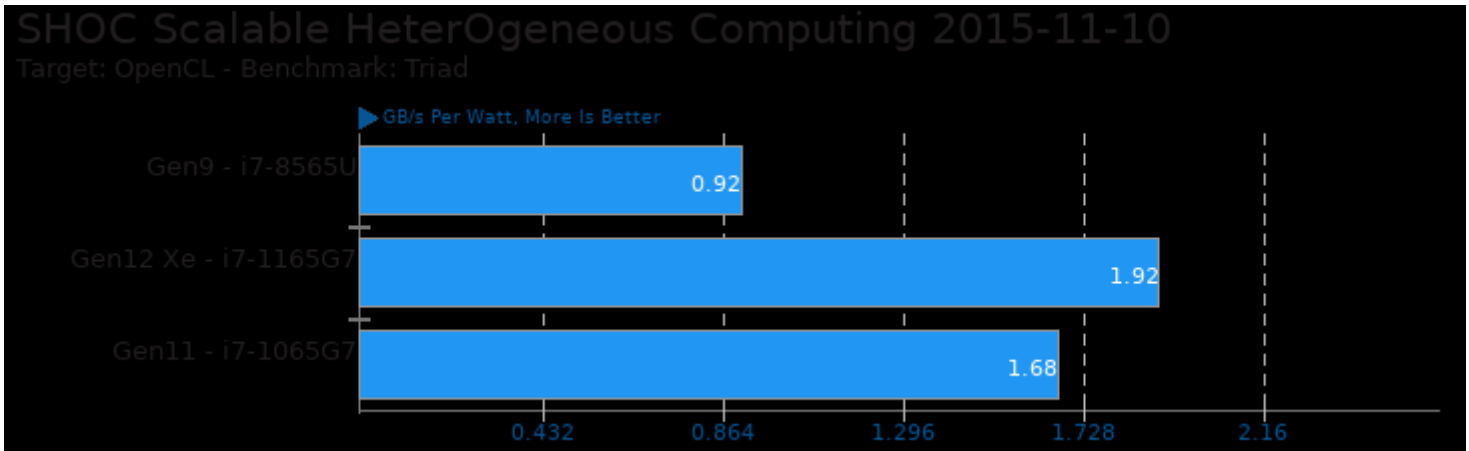
Tigerlake Xe Gen12 to Gen9

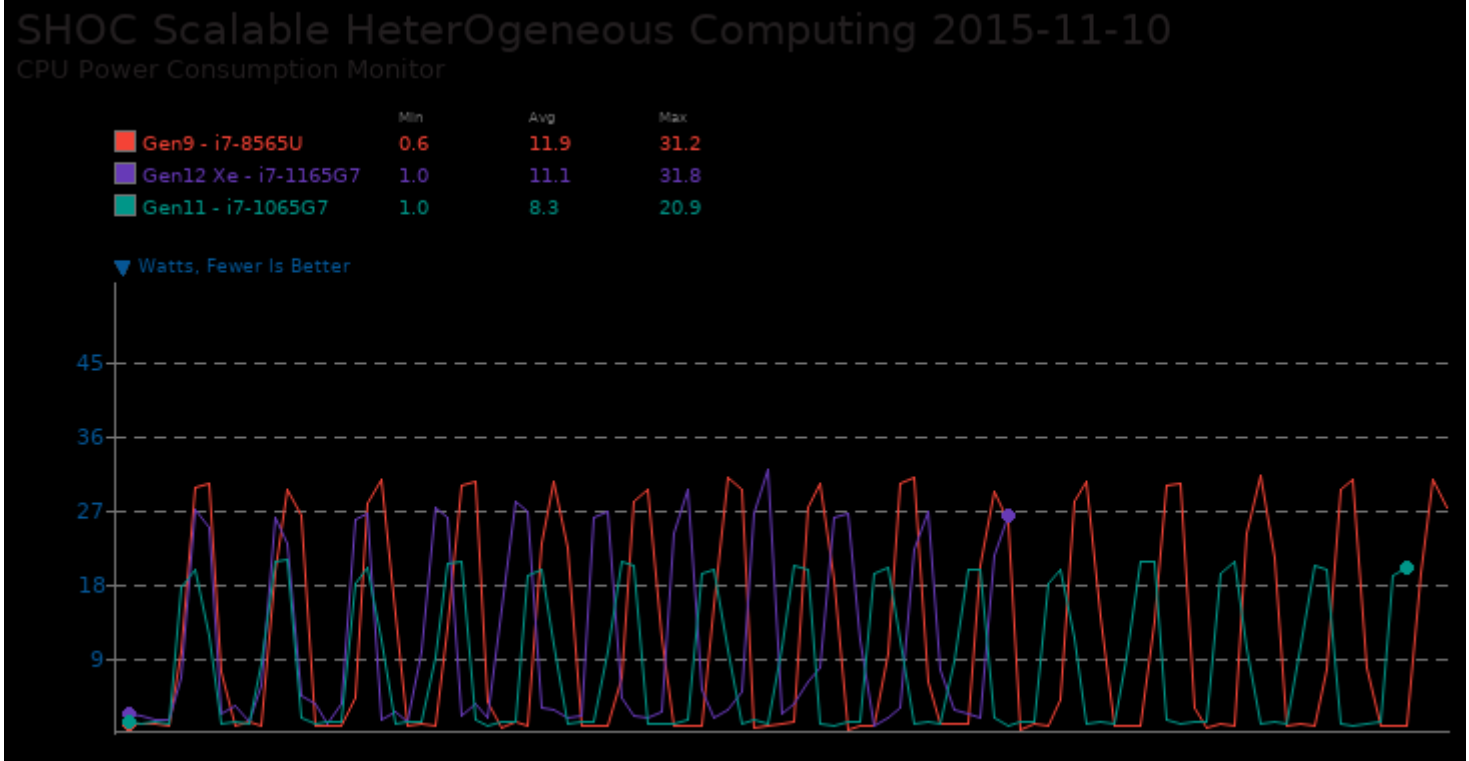


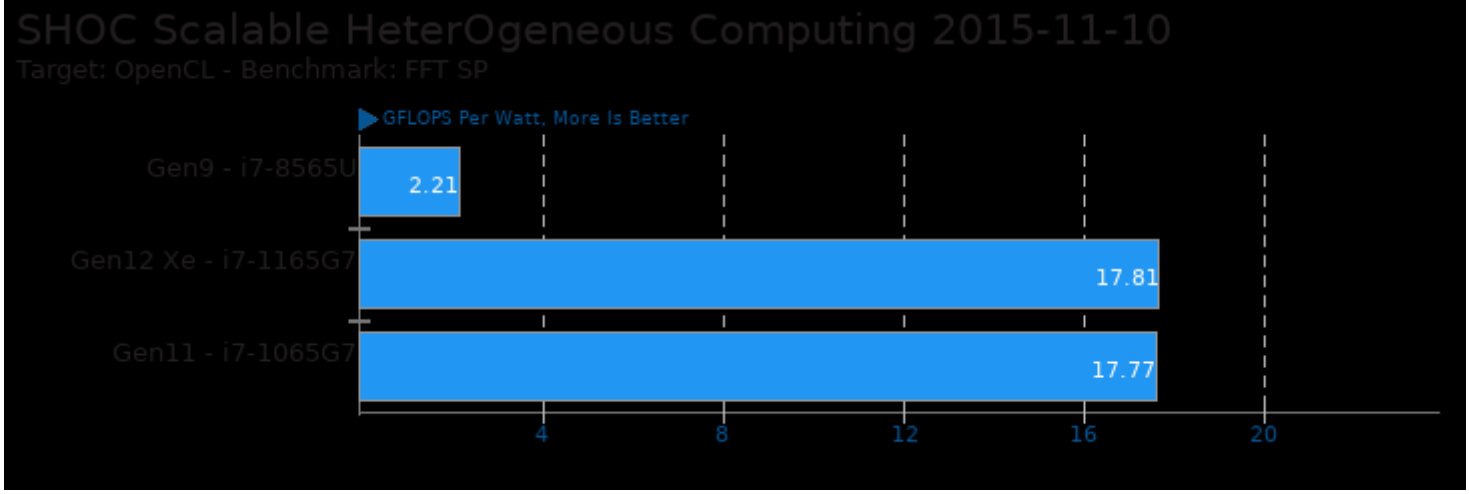

oneAPI Level Zero Tests
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
0.8
29.0
39.5
Gen12 Xe - i7-1165G7
1.9
22.9
36.7
Gen11 - i7-1065G7
1.2
15.5
31.1
Watts, Fewer Is Better
55
44
33
22
11
oneAPI Level Zero Tests
Test: Peak System Memory Copy to Shared Memory
GB/s Per Watt, More Is Better
Gen9 - i7-8565U
0.36
Gen12 Xe - i7-1165G7
0.67
Gen11 - i7-1065G7
0.90
0.2025
0.405
0.6075
0.81
1.0125
oneAPI Level Zero Tests
CPU Power Consumption Monitor
Watts, Fewer Is Better
Gen9 - i7-8565U
Min: 0.84 / Avg: 30.21 / Max: 40.35
Gen12 Xe - i7-1165G7
Min: 1.48 / Avg: 22.42 / Max: 36.61
Gen11 - i7-1065G7
Min: 1.01 / Avg: 15.39 / Max: 33.86
8
16
24
32
40


RealSR-NCNN 20200818
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
0.7
25.7
30.7
Gen12 Xe - i7-1165G7
1.5
22.1
26.6
Gen11 - i7-1065G7
1.0
15.5
22.7
Watts, Fewer Is Better
45
36
27
18
9
RealSR-NCNN 20200818
CPU Power Consumption Monitor
Watts, Fewer Is Better
Gen9 - i7-8565U
Min: 0.82 / Avg: 25.69 / Max: 29.43
Gen12 Xe - i7-1165G7
Min: 1.45 / Avg: 22.26 / Max: 26.61
Gen11 - i7-1065G7
Min: 0.99 / Avg: 15.84 / Max: 22.6
7
14
21
28
35

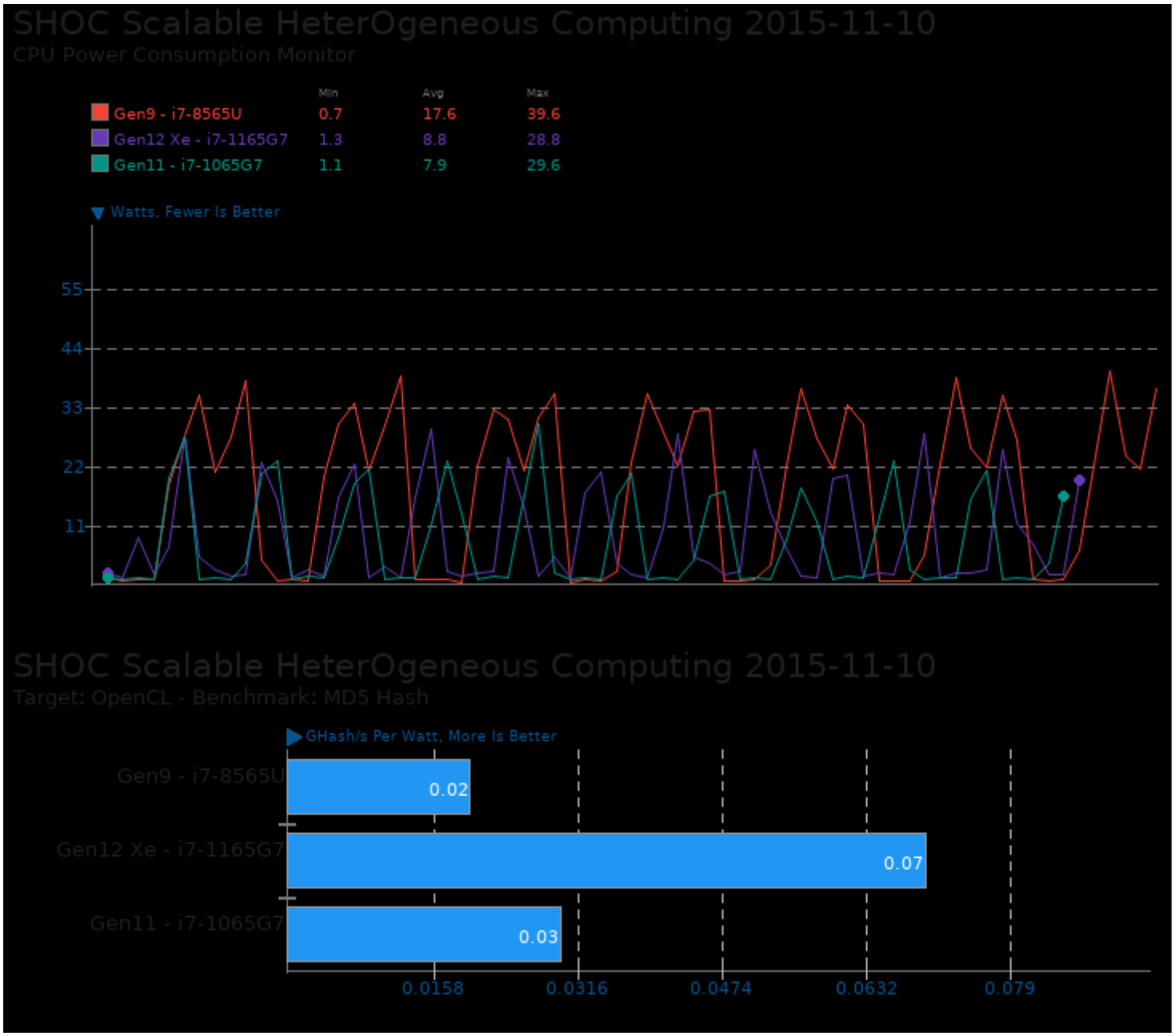

FinanceBench 2016-06-06
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U 0.7 14.8 22.7
Gen12 Xe - i7-1165G7 1.3 15.9 32.7
Gen11 - i7-1065G7 0.9 12.9 31.9
Watts, Fewer Is Better
50
40
30
20
10
FinanceBench 2016-06-06
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U 0.7 5.0 20.7
Gen12 Xe - i7-1165G7 1.0 5.1 16.9
Gen11 - i7-1065G7 1.1 3.8 13.9
Watts, Fewer Is Better
30
24
18
12
6


SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: Triad
GB/s Per Watt, More Is Better
Gen9 - i7-8565U
0.92
Gen12 Xe - i7-1165G7
1.92
Gen11 - i7-1065G7
1.68
0.432
0.864
1.296
1.728
2.16

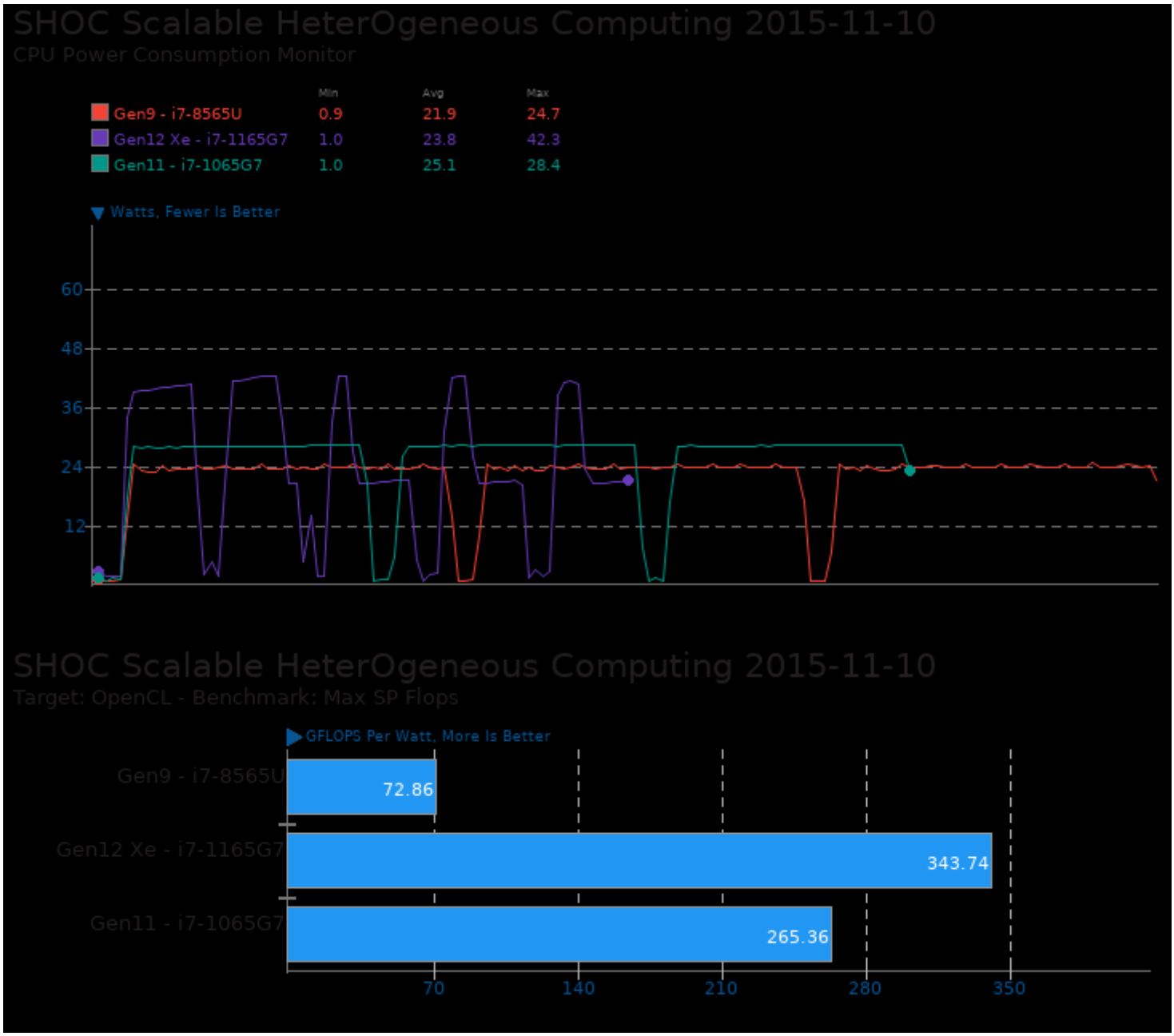

SHOC Scalable HeterOgeneous Computing 2015-11-10
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U 0.6 11.9 31.2
Gen12 Xe - i7-1165G7 1.0 11.1 31.8
Gen11 - i7-1065G7 1.0 8.3 20.9
Watts, Fewer Is Better
45
36
27
18
9


SHOC Scalable HeterOgeneous Computing 2015-11-10
Target: OpenCL - Benchmark: FFT SP
GFLOPS Per Watt, More Is Better
Gen9 - i7-8565U
2.21
Gen12 Xe - i7-1165G7
17.81
Gen11 - i7-1065G7
17.77
4
8
12
16
20

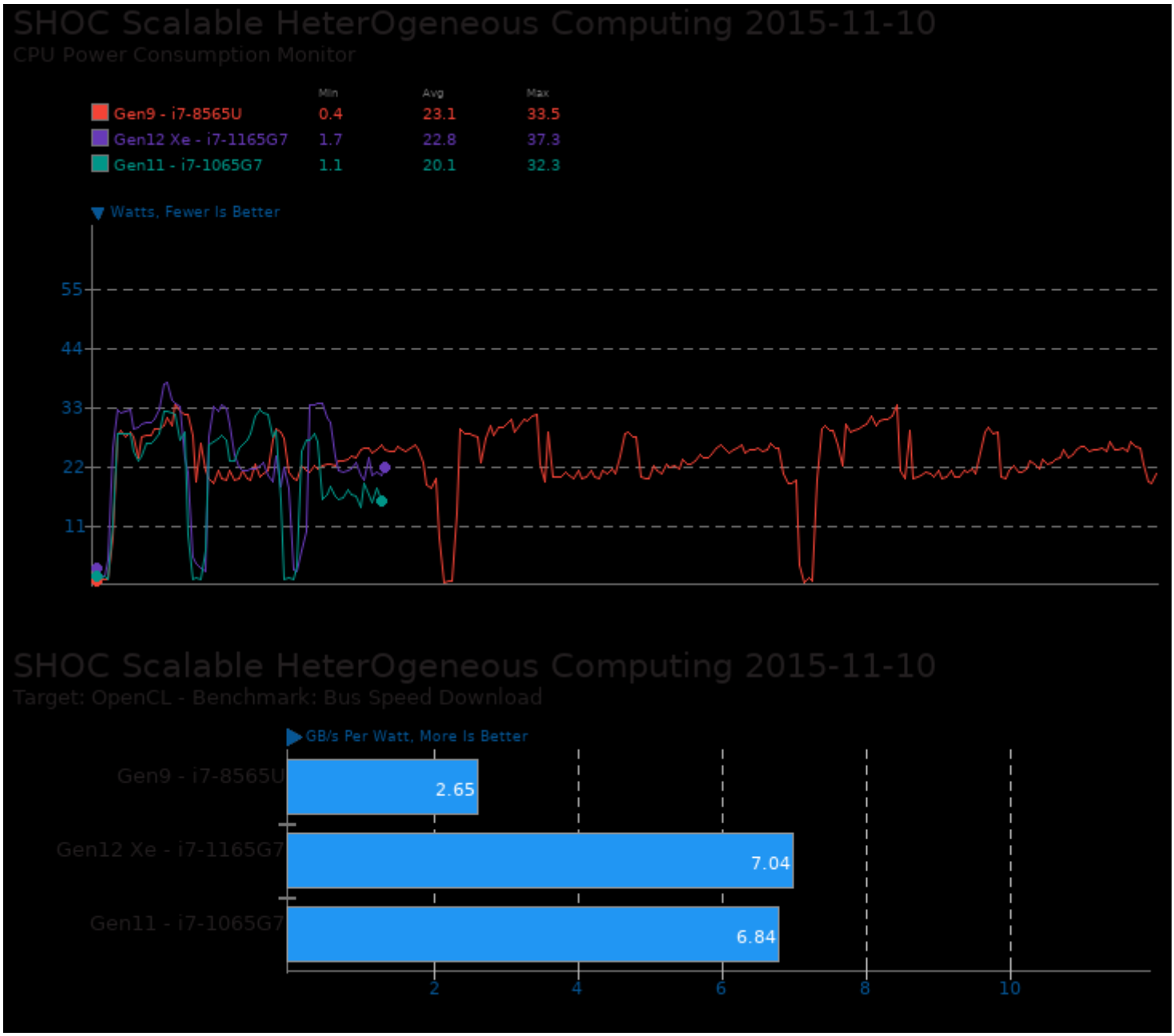
Tigerlake Xe Gen12 to Gen9



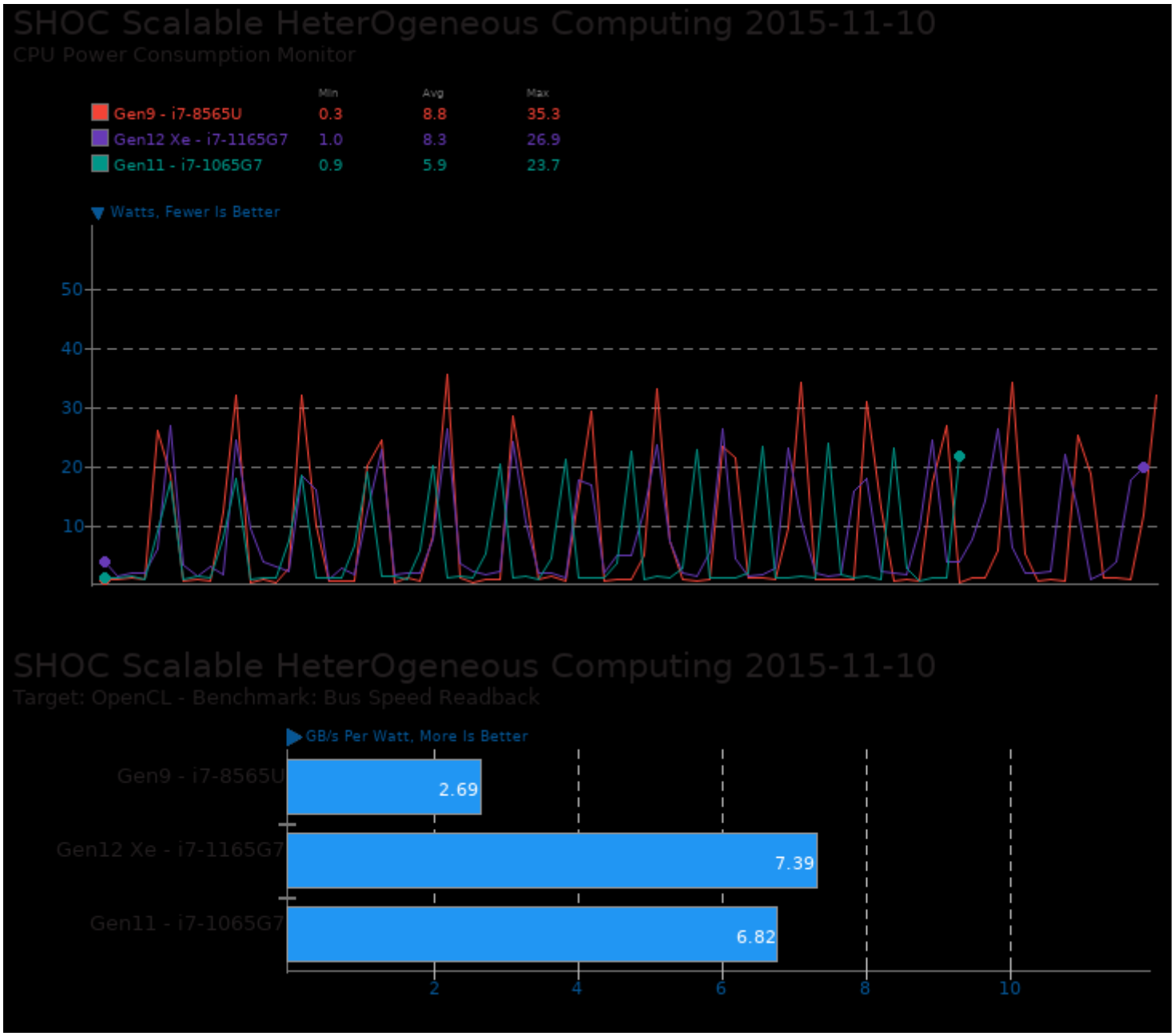
Tigerlake Xe Gen12 to Gen9



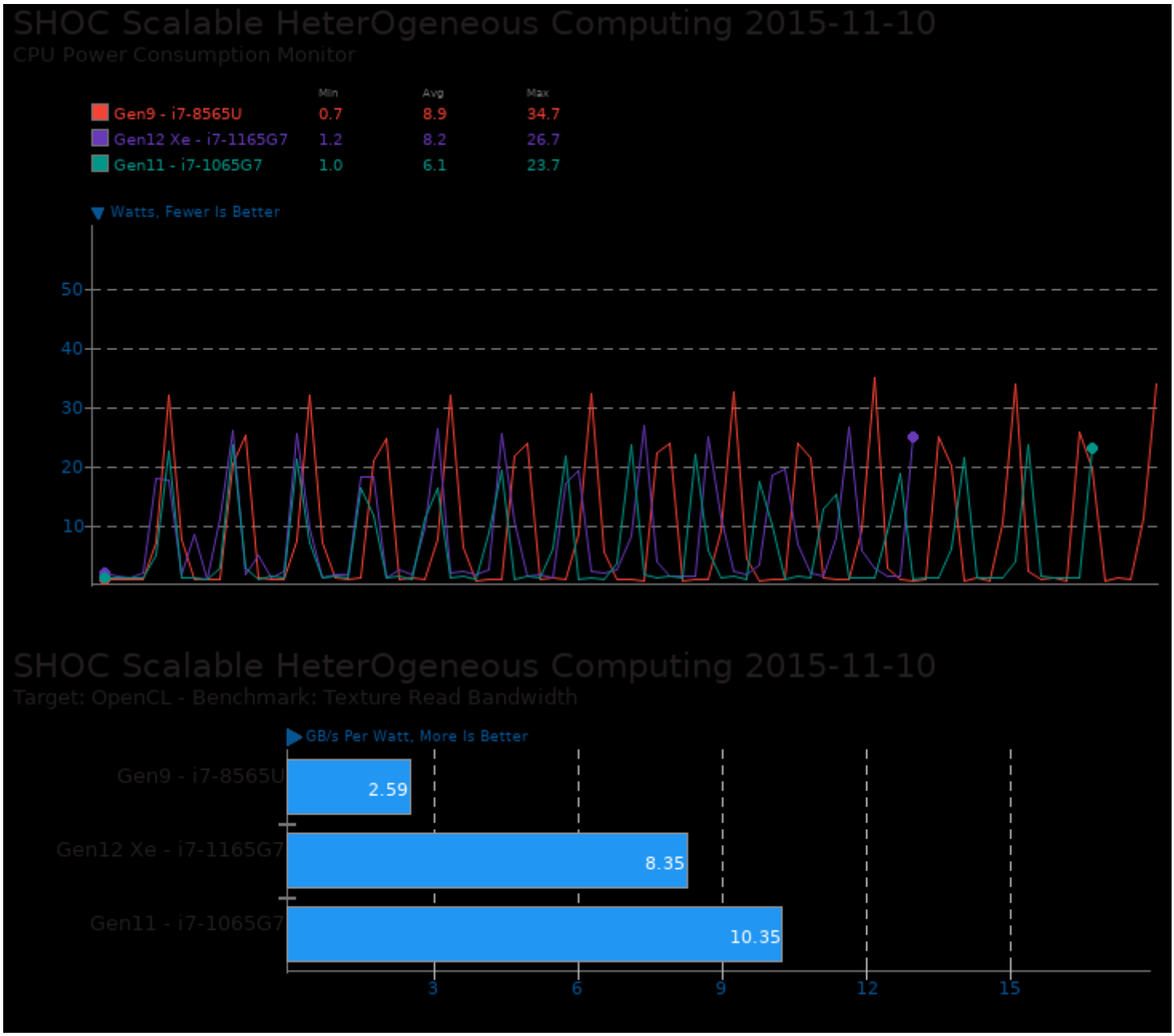
Tigerlake Xe Gen12 to Gen9



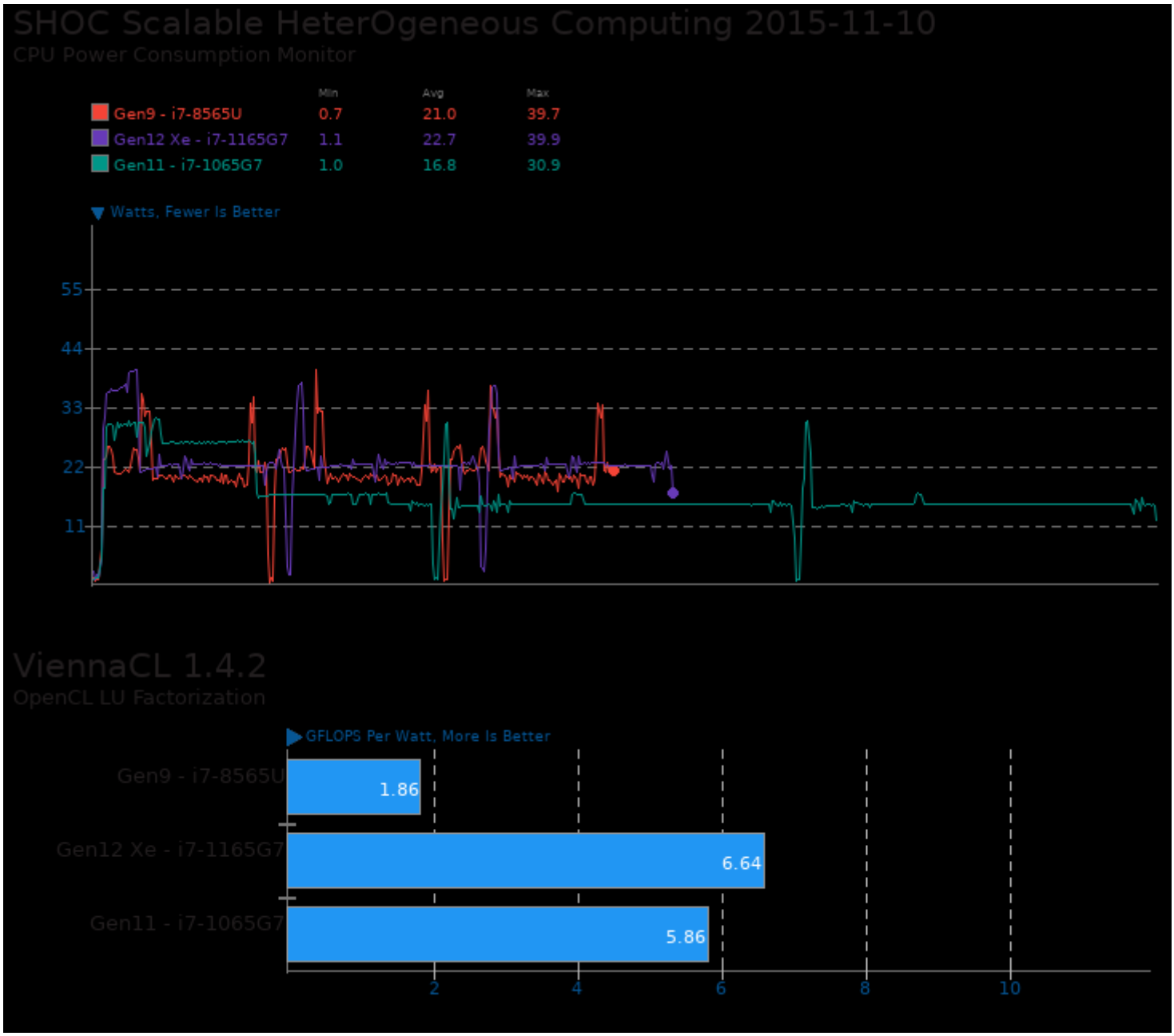
Tigerlake Xe Gen12 to Gen9



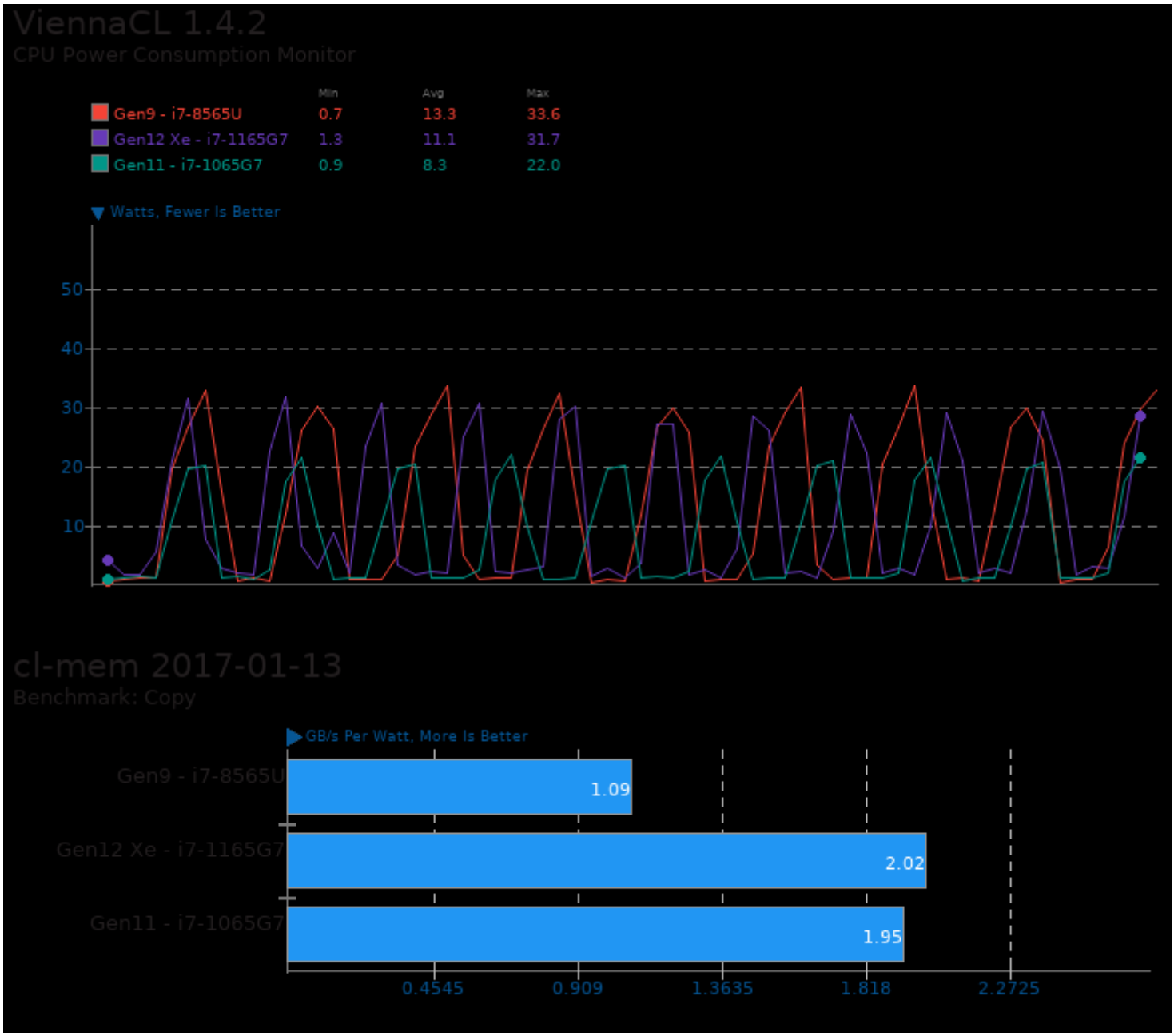
Tigerlake Xe Gen12 to Gen9



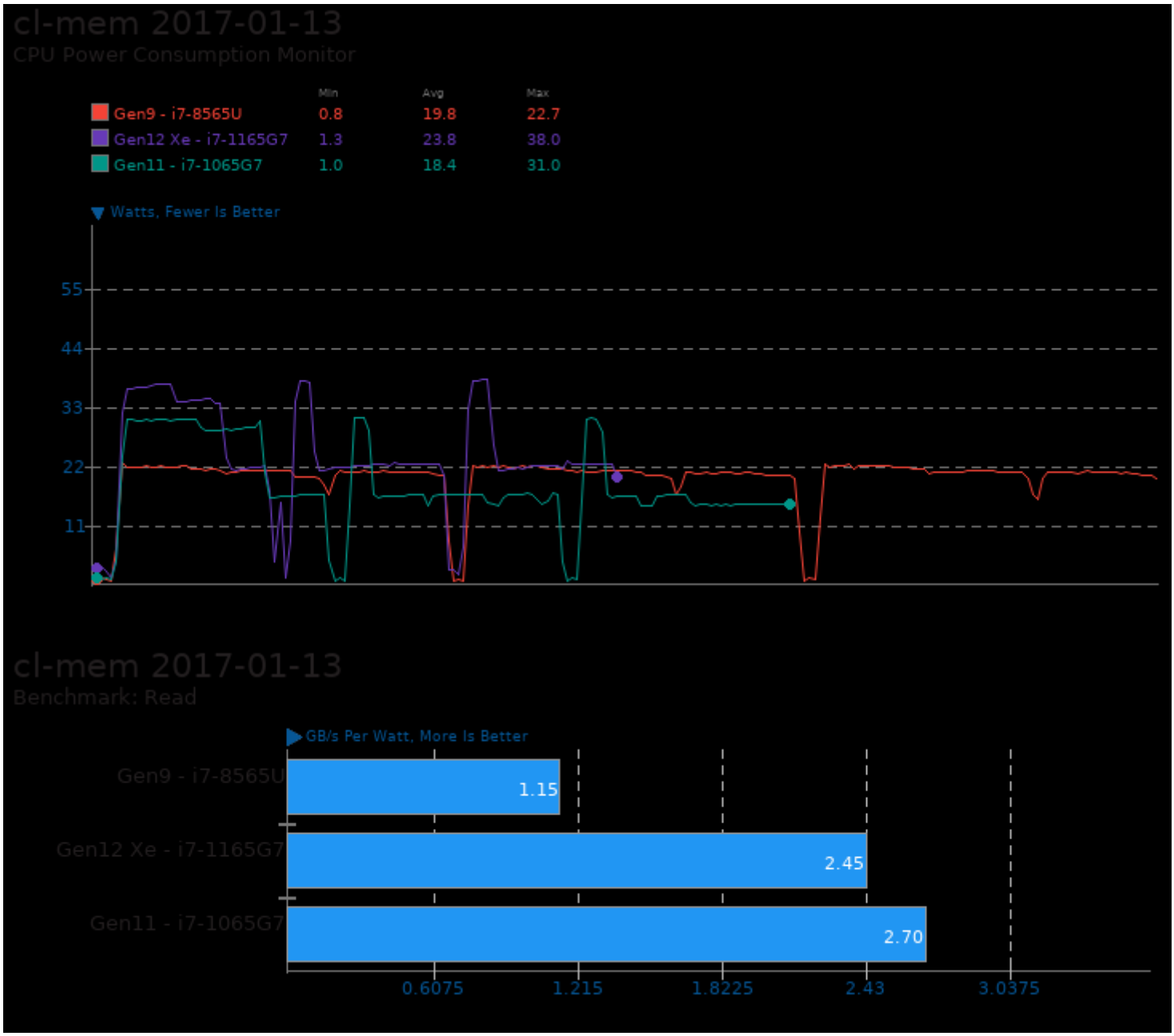
Tigerlake Xe Gen12 to Gen9



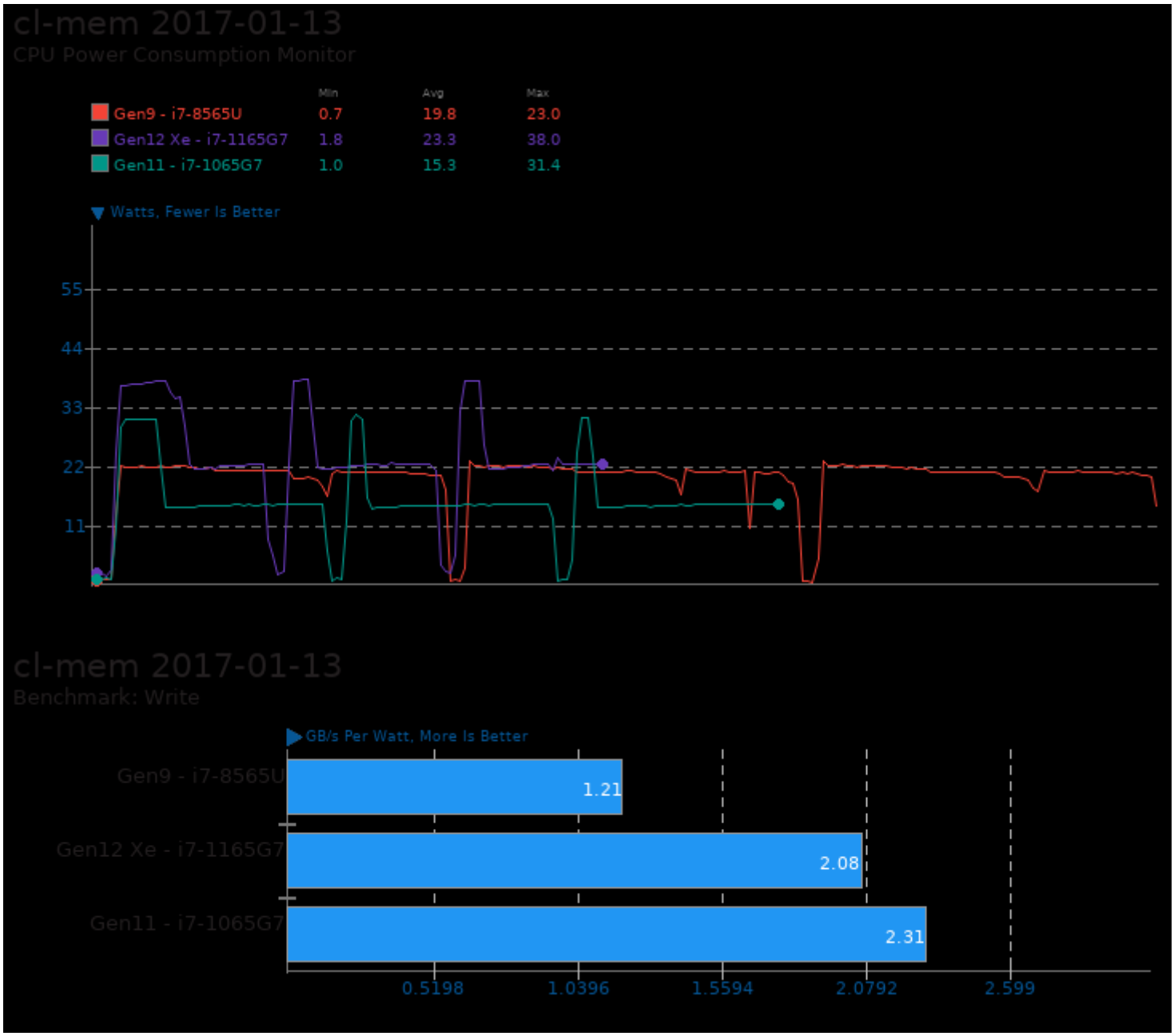
Tigerlake Xe Gen12 to Gen9



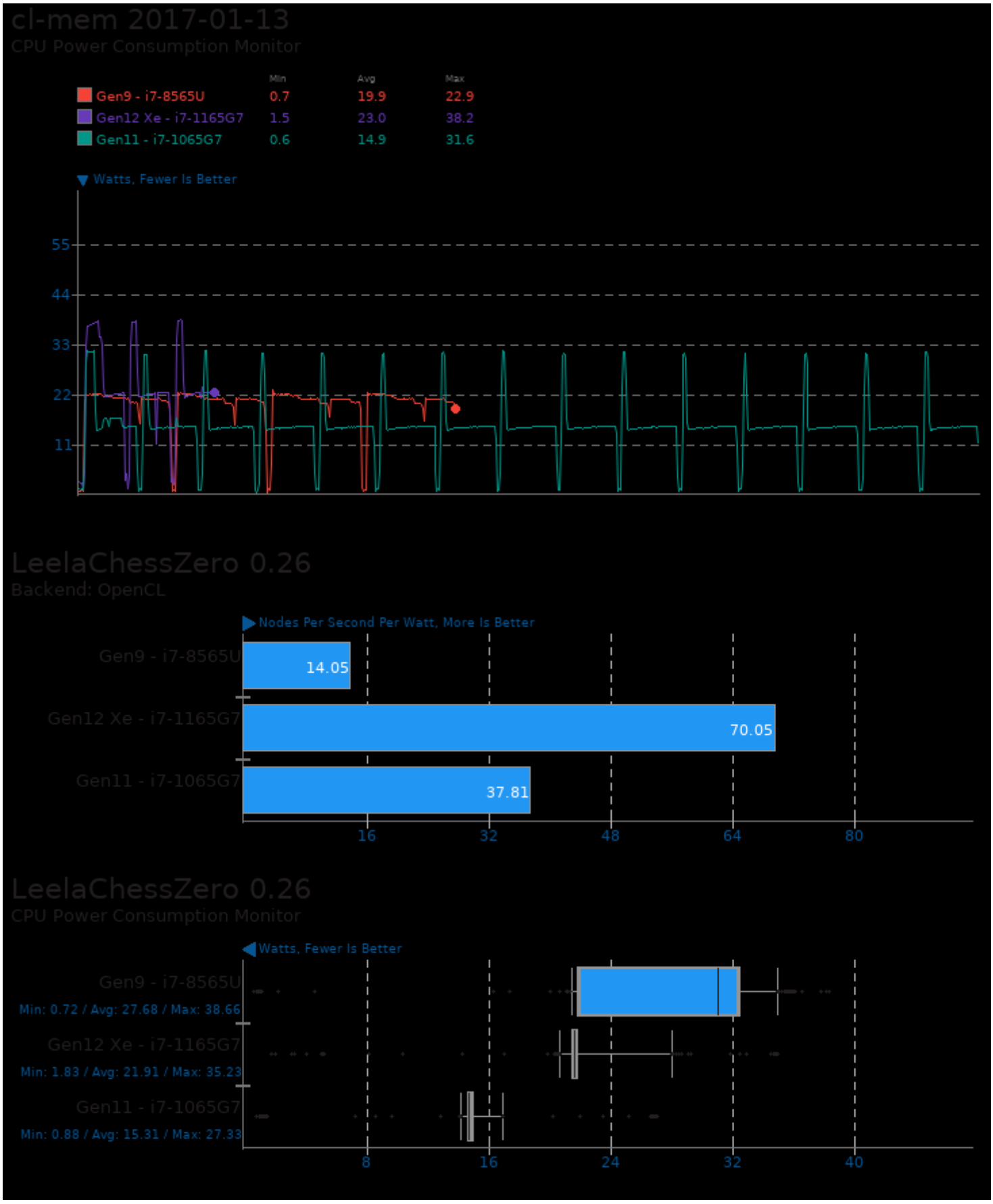
Tigerlake Xe Gen12 to Gen9



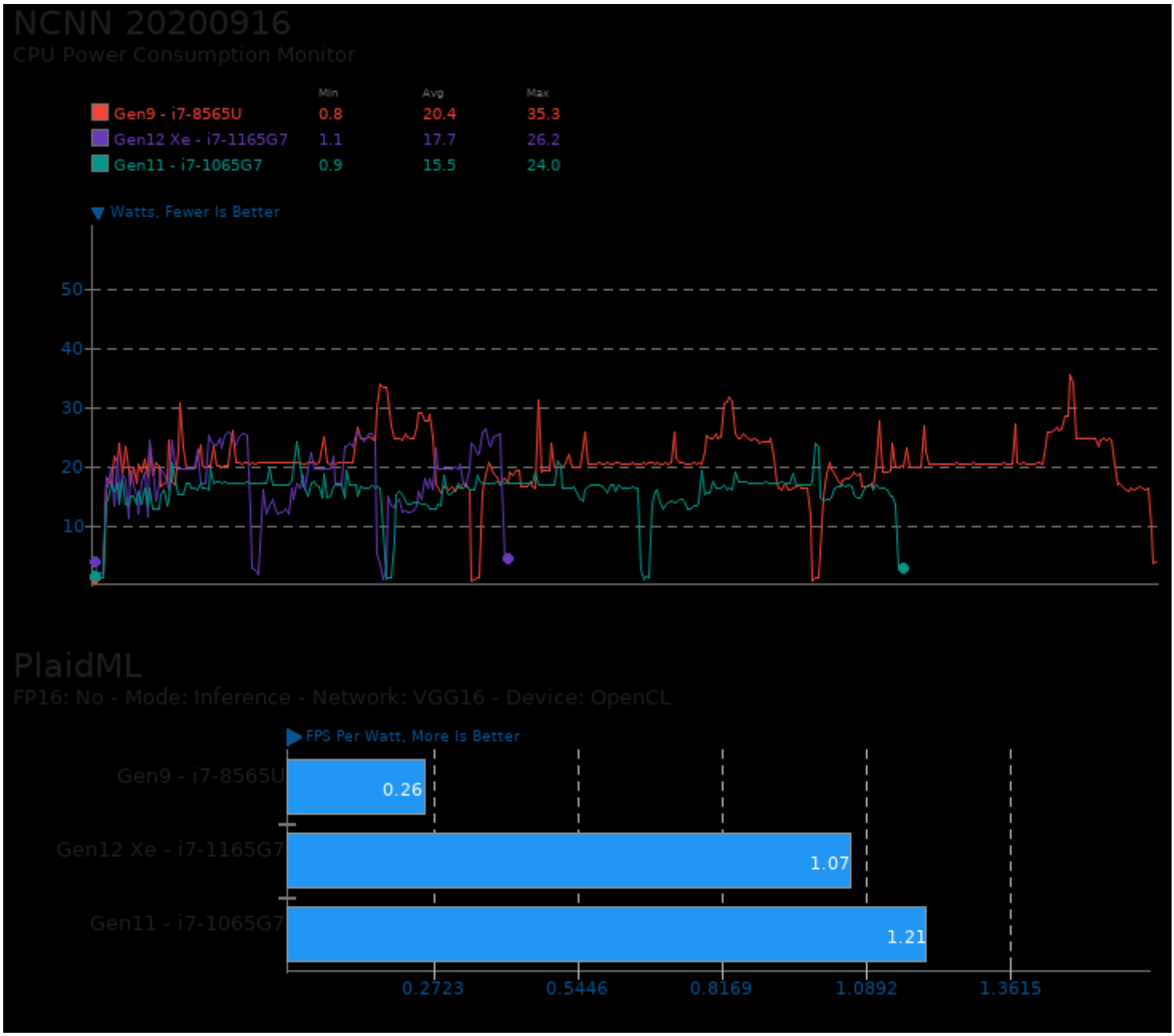
Tigerlake Xe Gen12 to Gen9

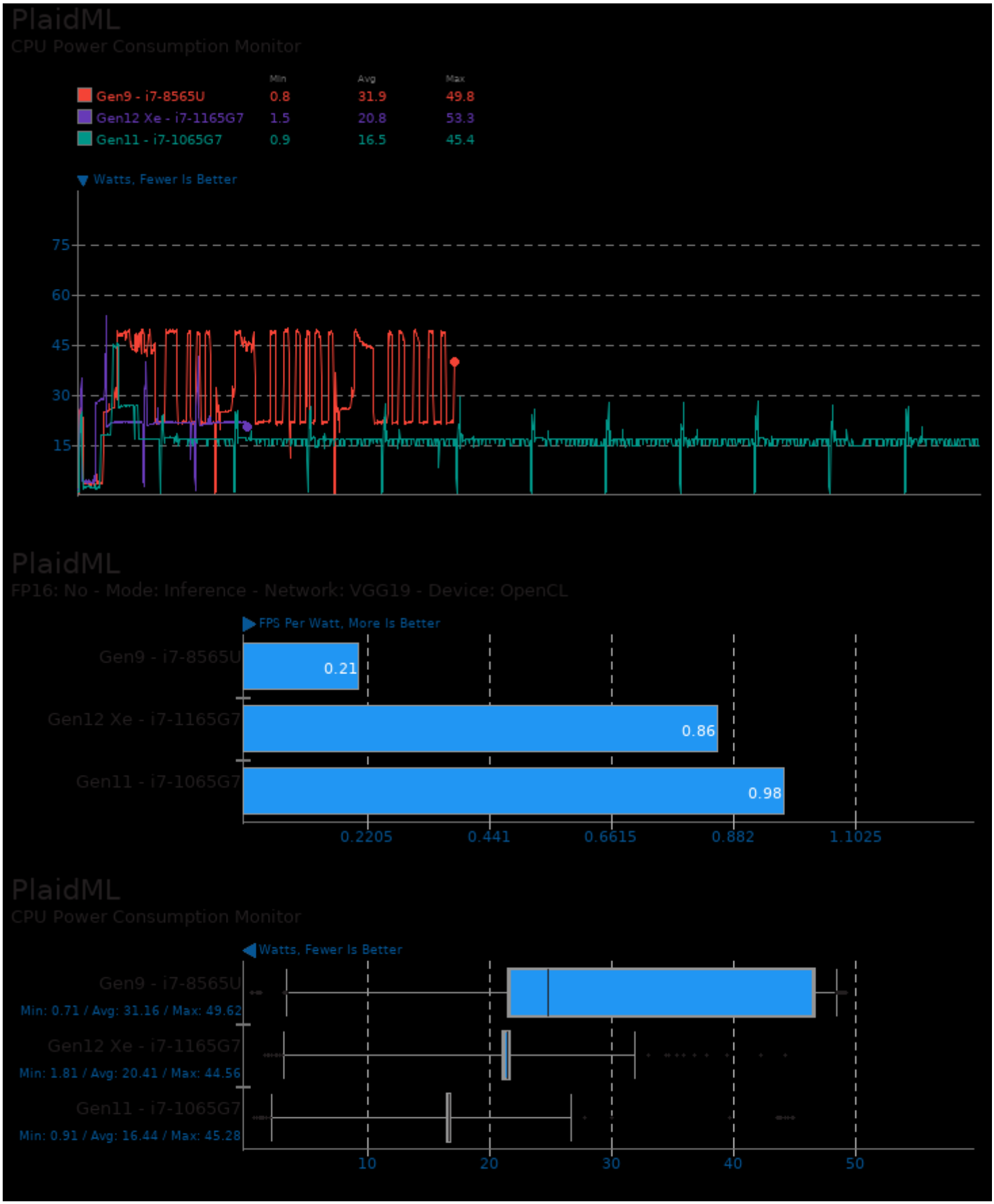


Tigerlake Xe Gen12 to Gen9

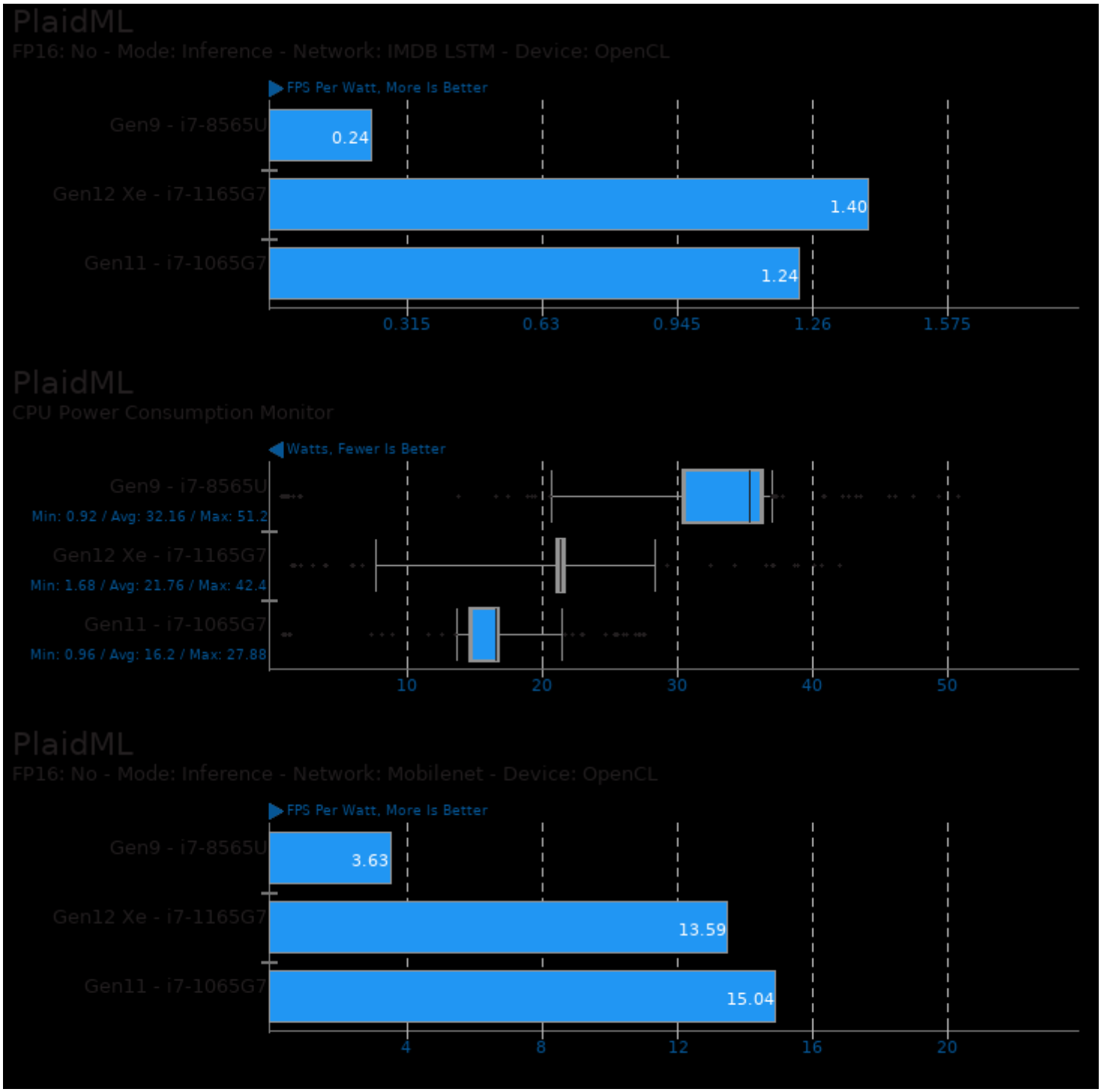


Tigerlake Xe Gen12 to Gen9

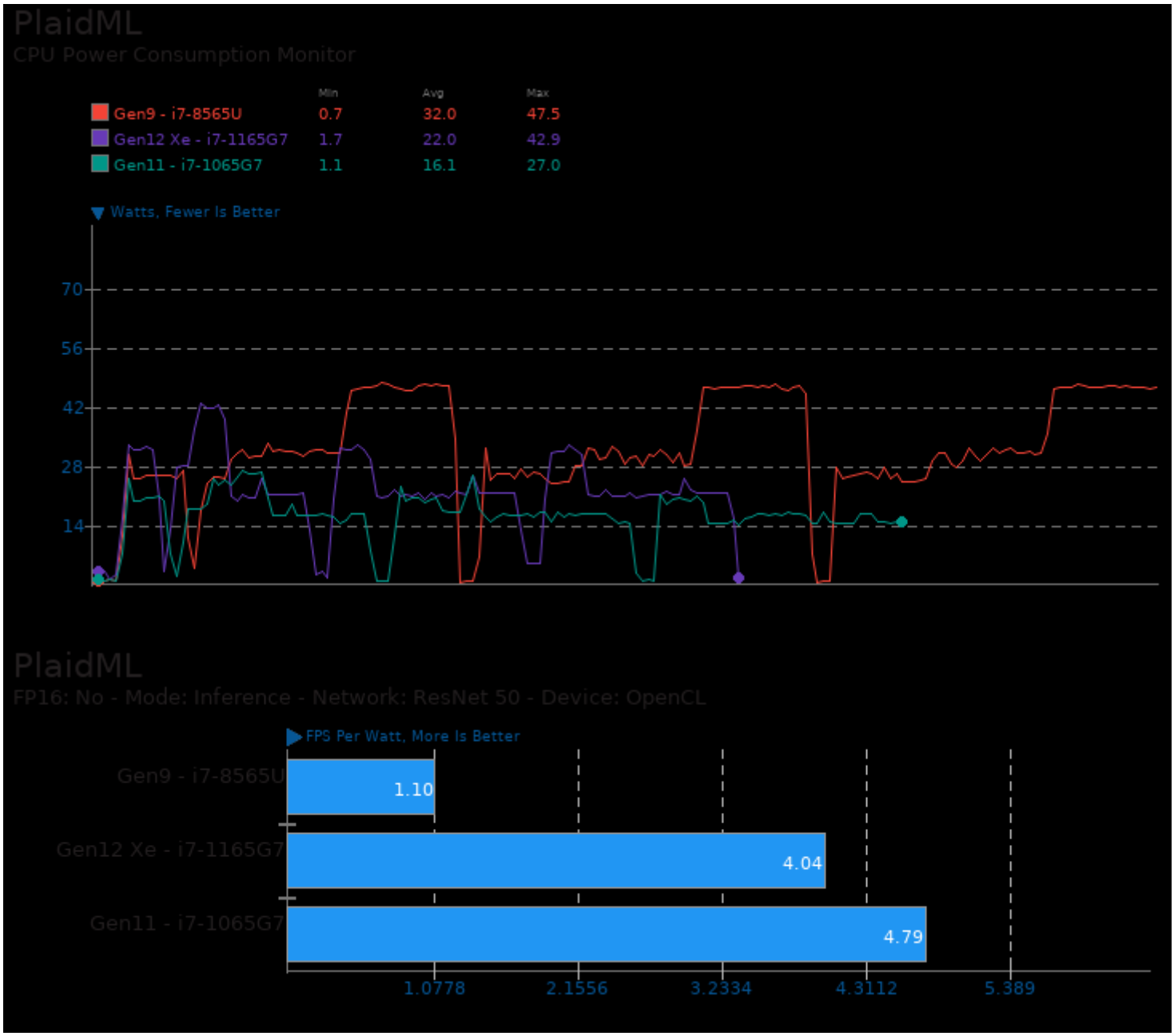



PlaidML
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
0.8
31.9
49.8
Gen12 Xe - i7-1165G7
1.5
20.8
53.3
Gen11 - i7-1065G7
0.9
16.5
45.4
Watts, Fewer Is Better
75
60
45
30
15
PlaidML
FP16: No - Mode: Inference - Network: VGG19 - Device: OpenCL
FPS Per Watt, More Is Better
Gen9 - i7-8565U
0.21
Gen12 Xe - i7-1165G7
0.86
Gen11 - i7-1065G7
0.98
0.2205
0.441
0.6615
0.882
1.1025
PlaidML
CPU Power Consumption Monitor
Watts, Fewer Is Better
Gen9 - i7-8565U
Min: 0.71 / Avg: 31.16 / Max: 49.62
Gen12 Xe - i7-1165G7
Min: 1.81 / Avg: 20.41 / Max: 44.56
Gen11 - i7-1065G7
Min: 0.91 / Avg: 16.44 / Max: 45.28
10
20
30
40
50

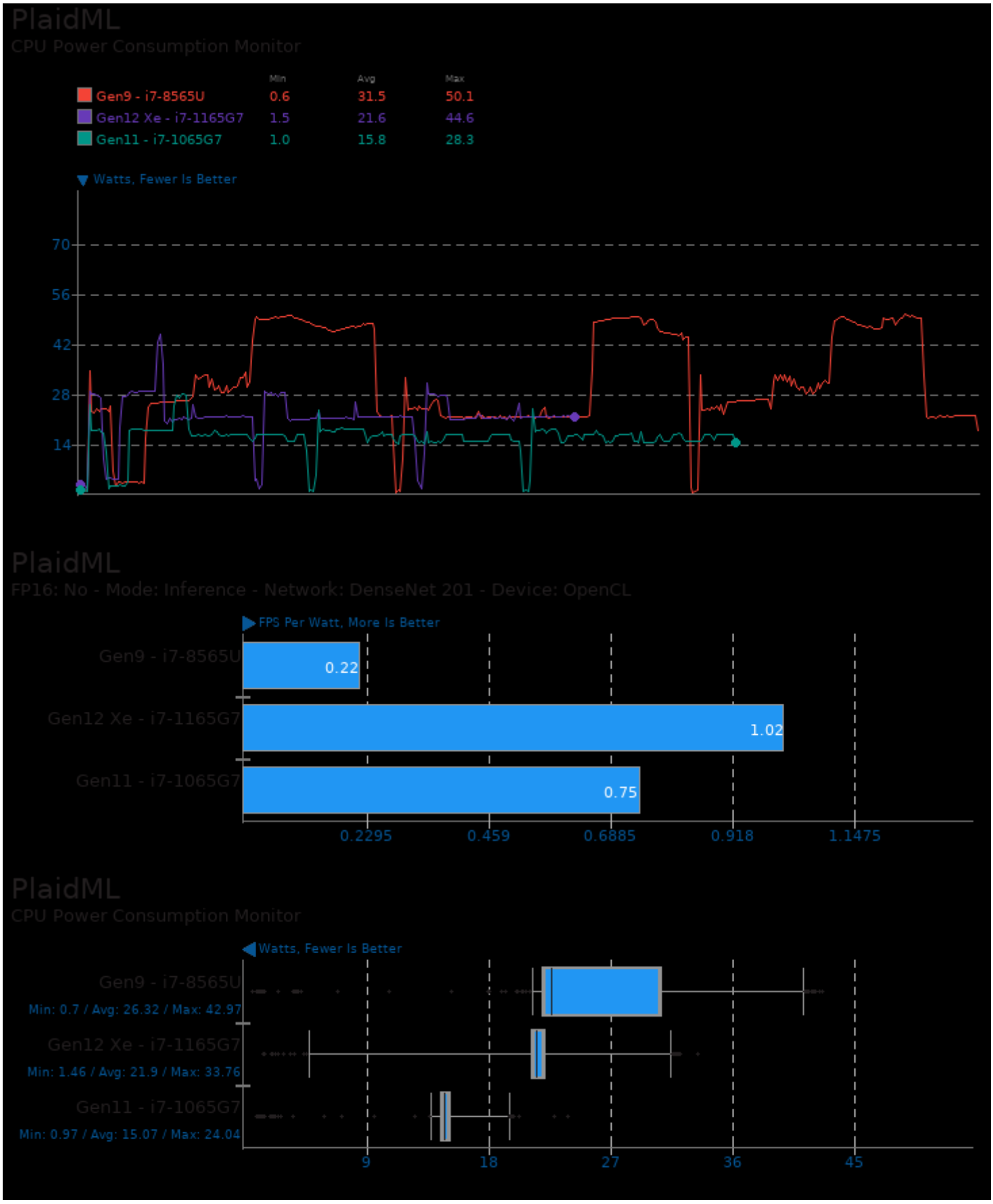
Tigerlake Xe Gen12 to Gen9



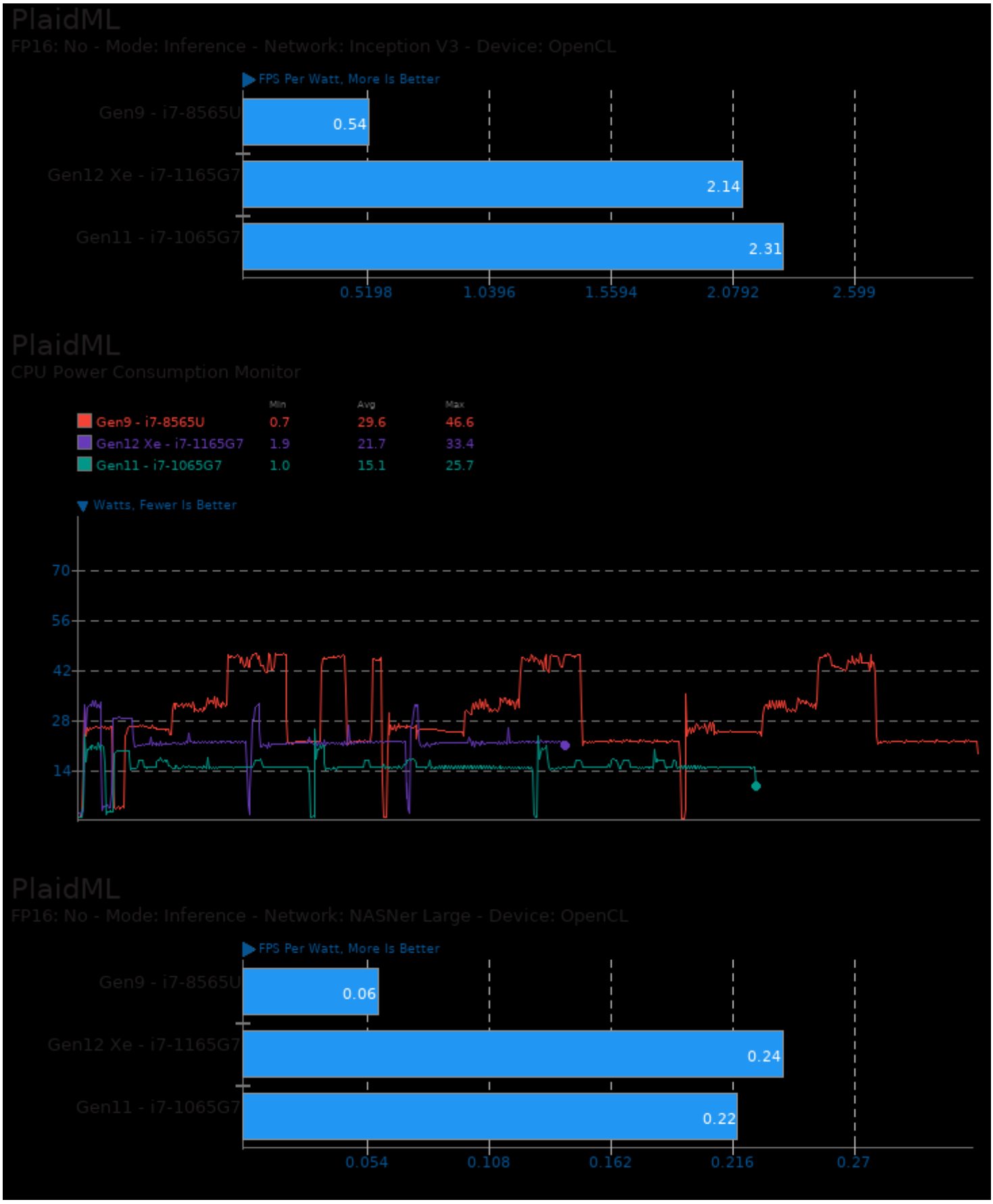
Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9



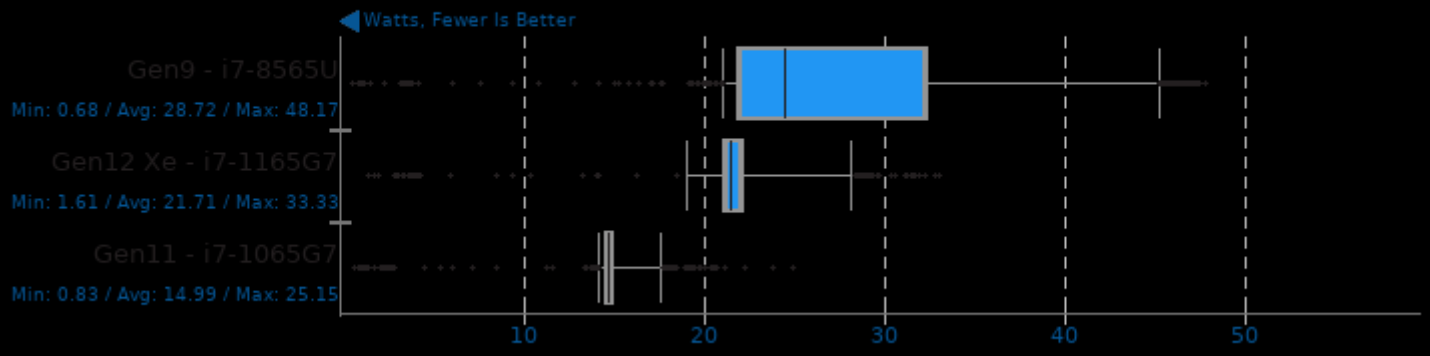
Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9

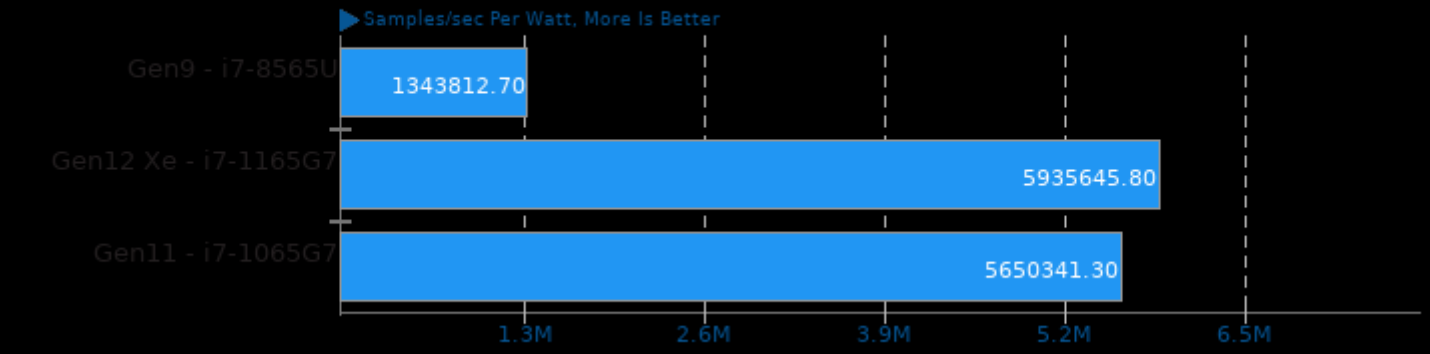
PlaidML

CPU Power Consumption Monitor



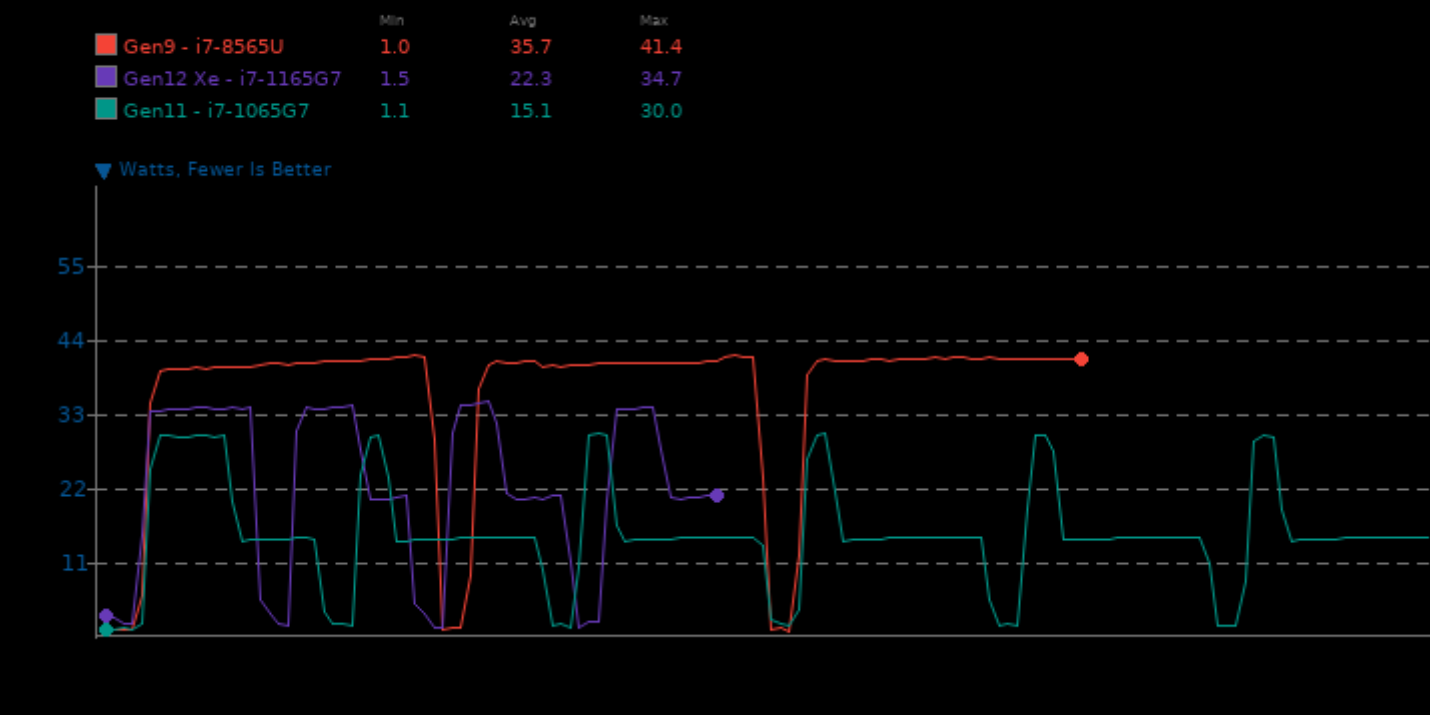
JuliaGPU 1.2pts1

OpenCL Device: GPU

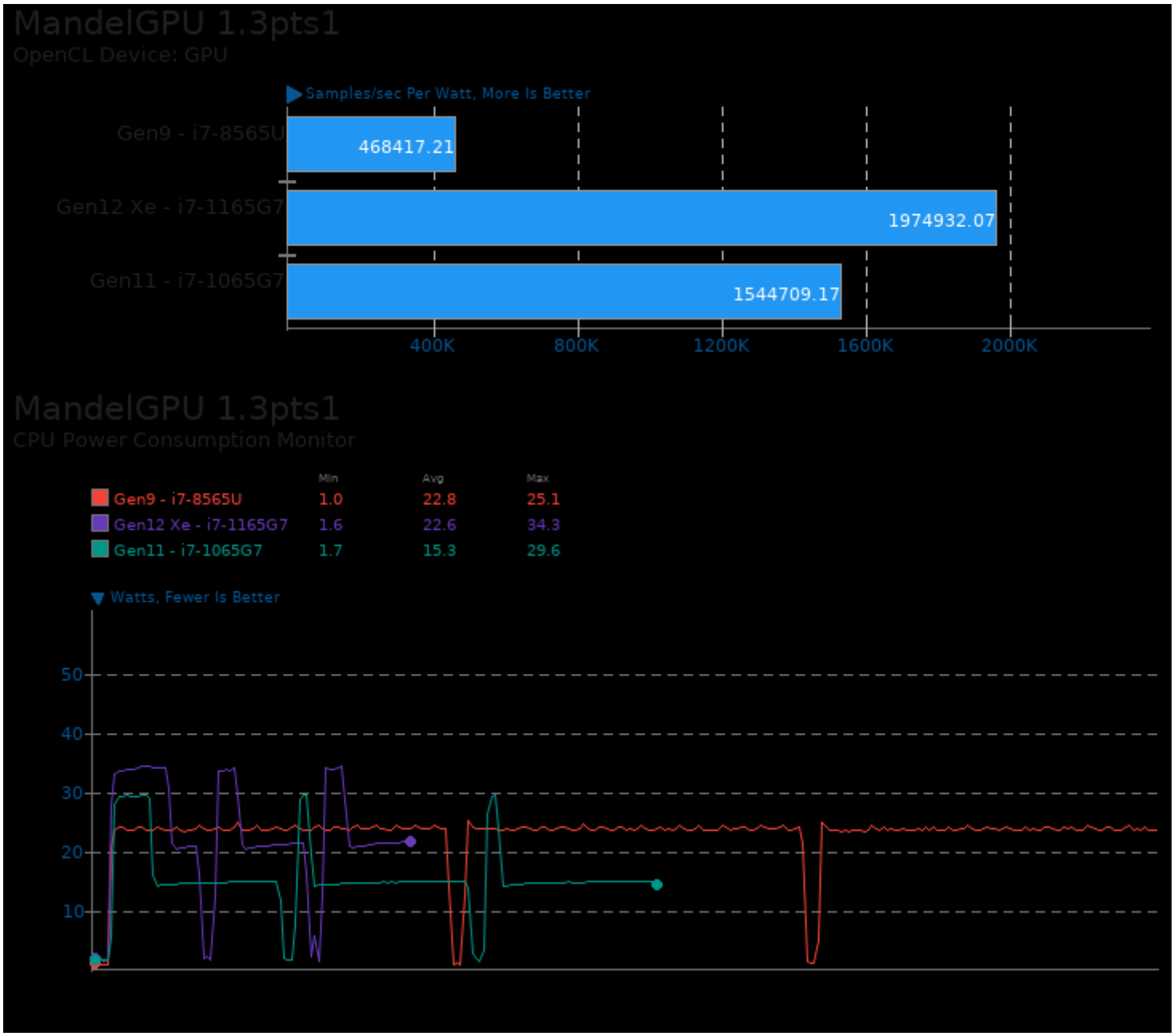


JuliaGPU 1.2pts1

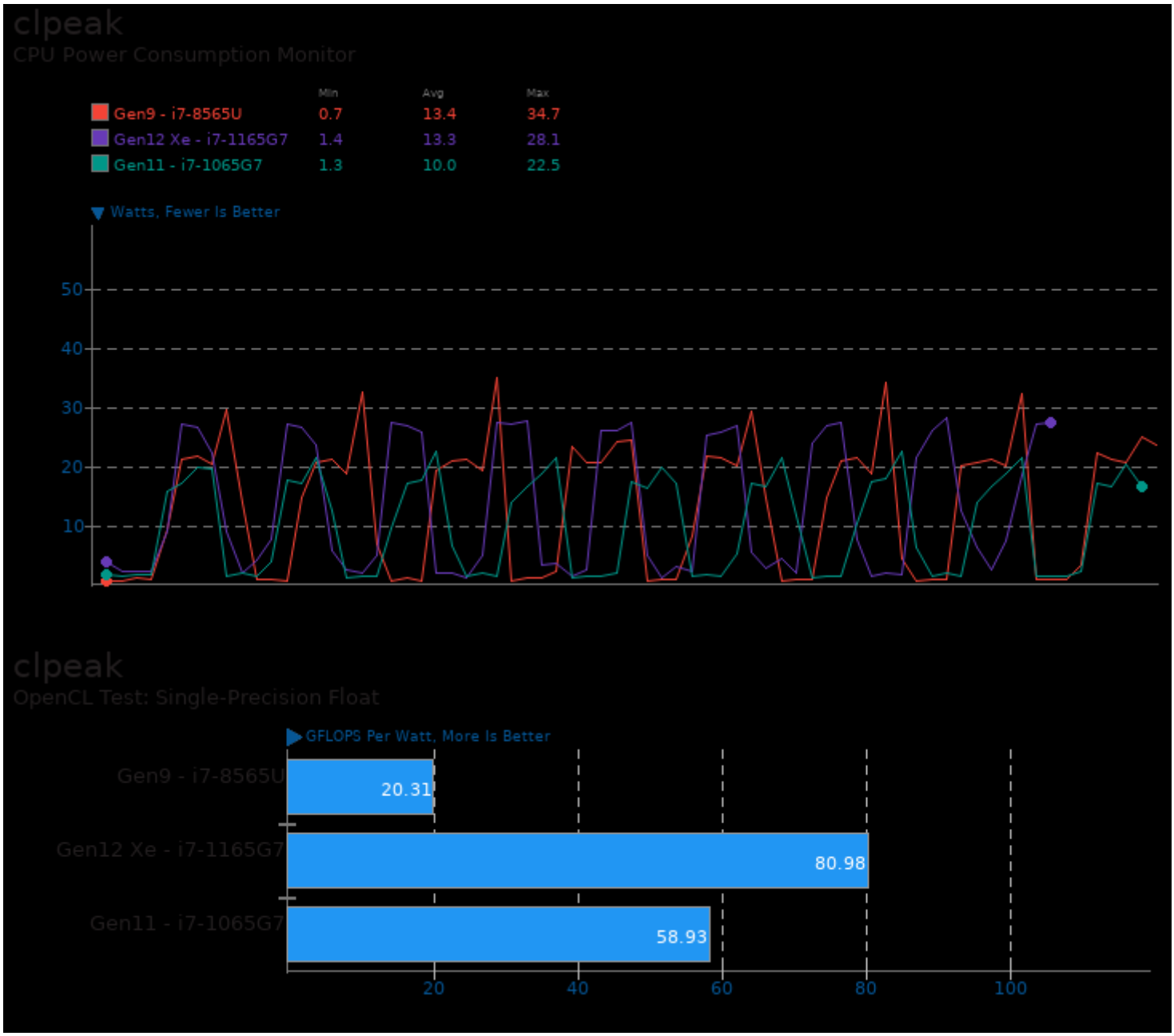
CPU Power Consumption Monitor



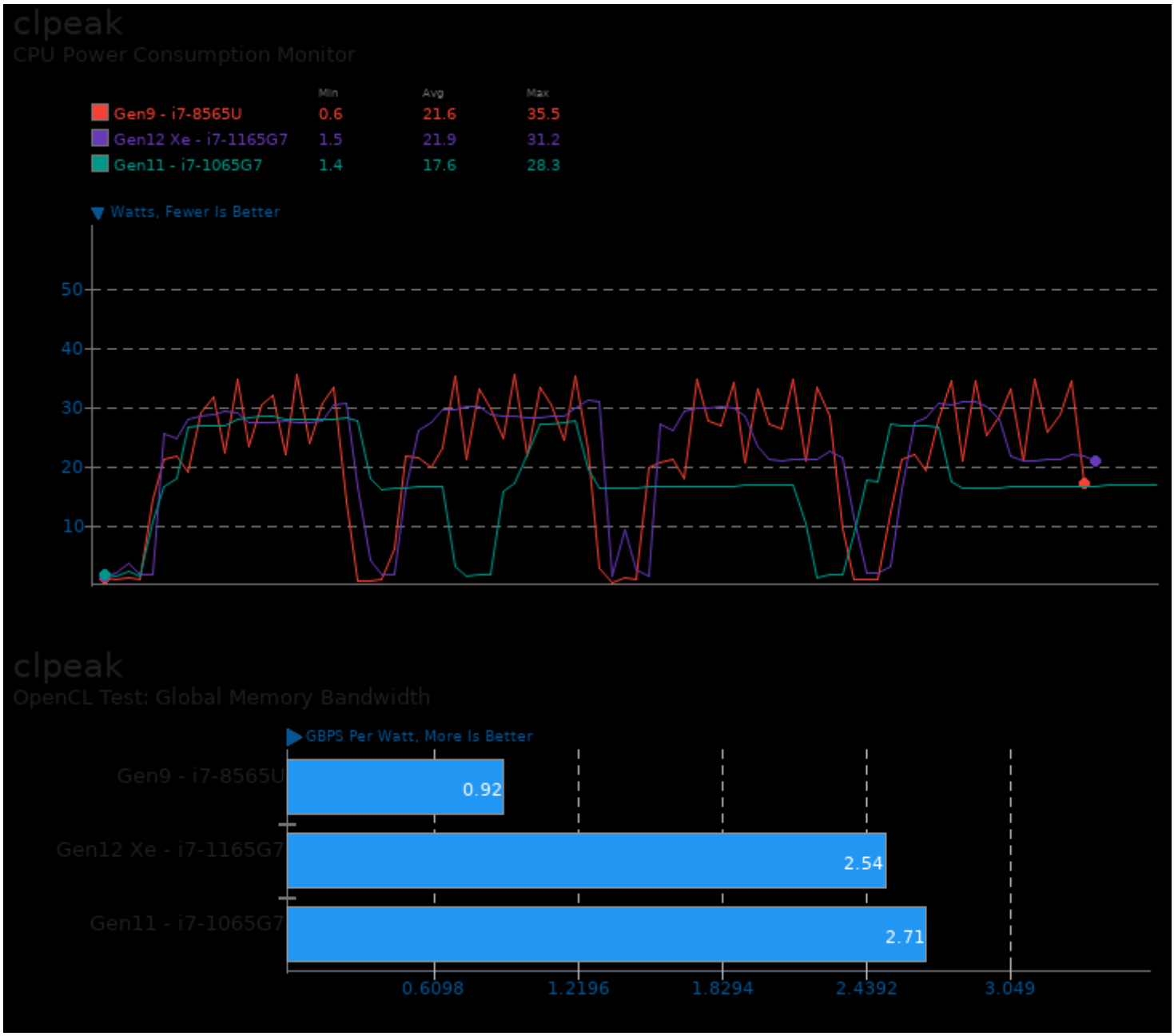
Tigerlake Xe Gen12 to Gen9



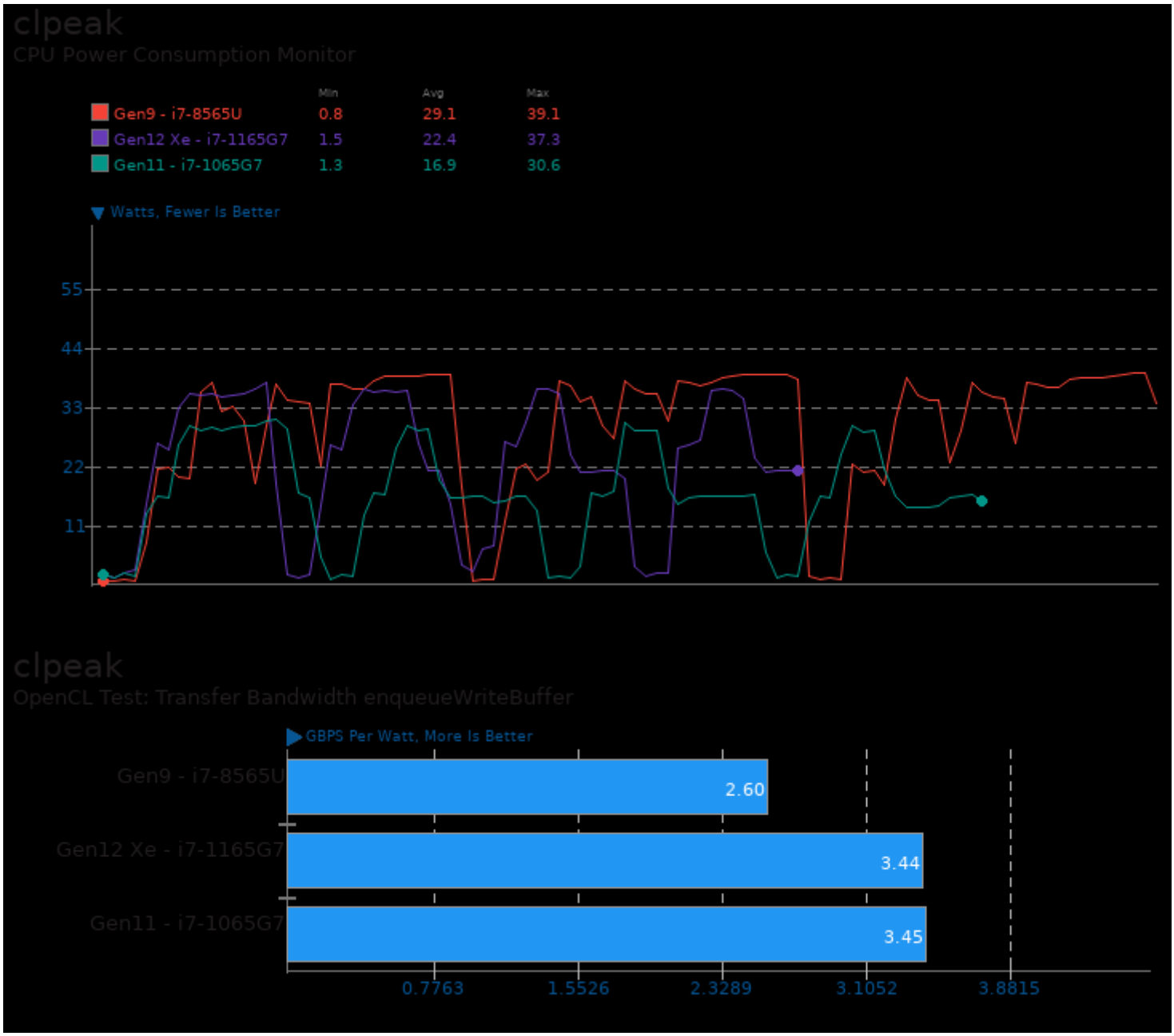
Tigerlake Xe Gen12 to Gen9



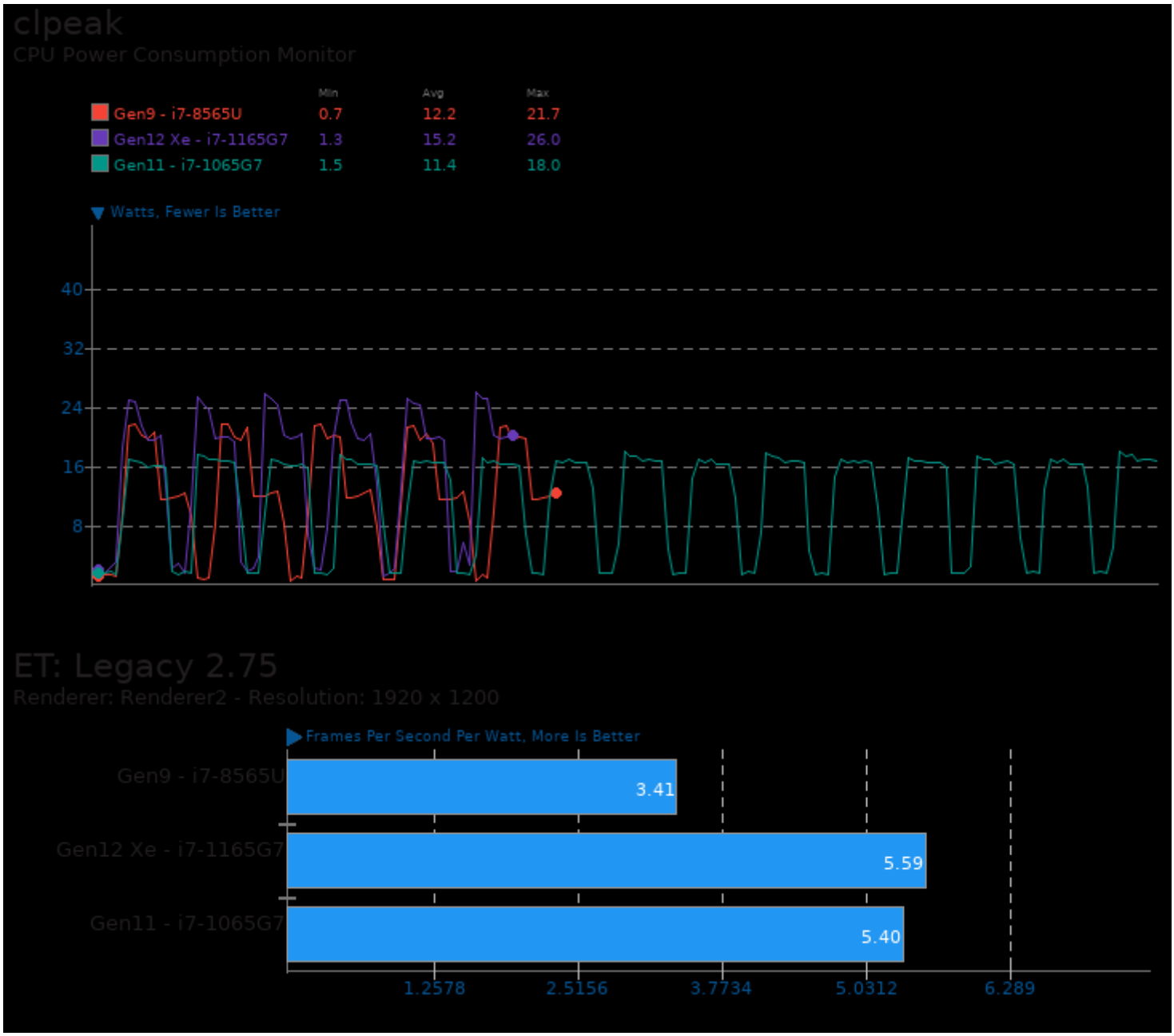
Tigerlake Xe Gen12 to Gen9



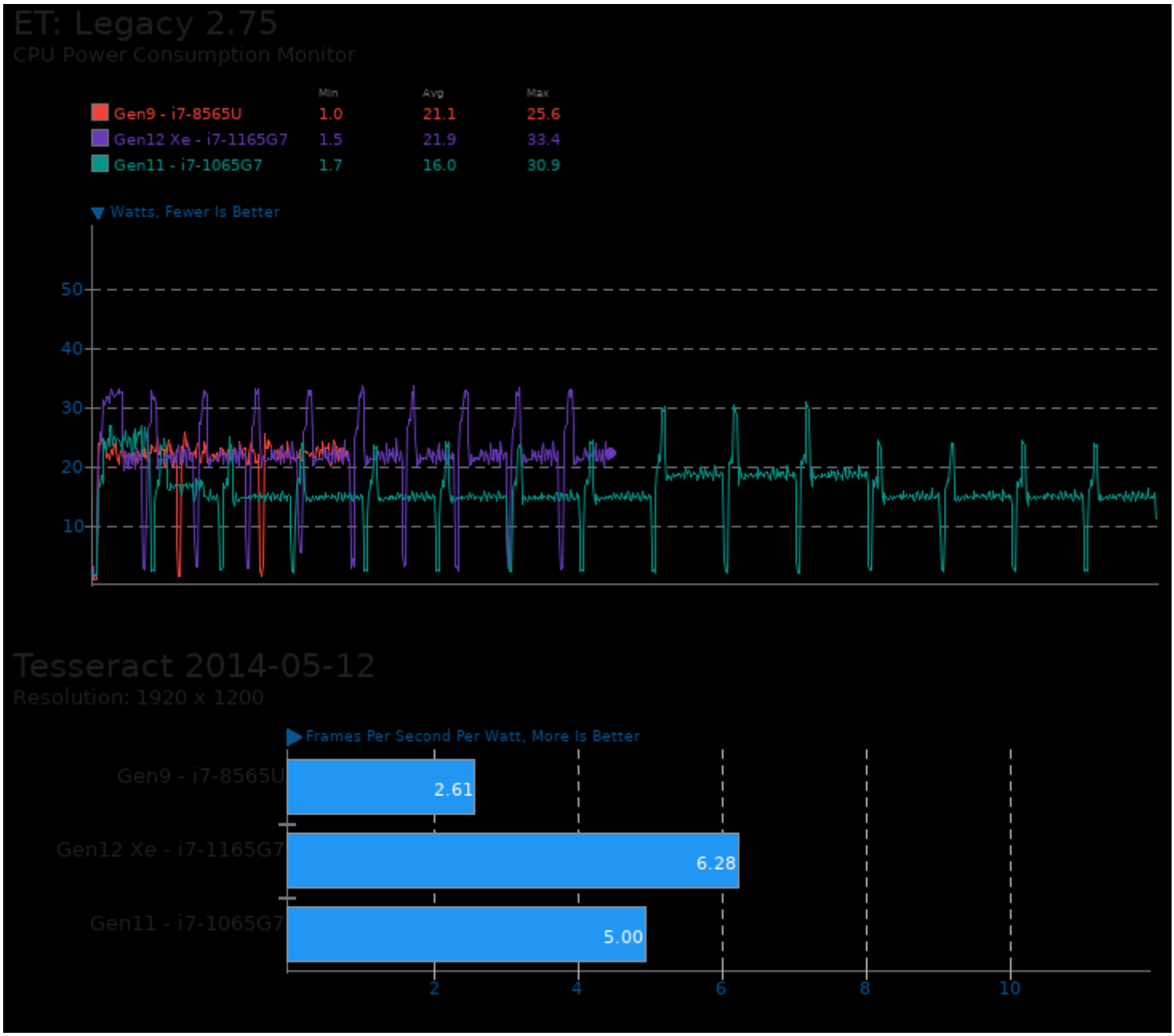
Tigerlake Xe Gen12 to Gen9



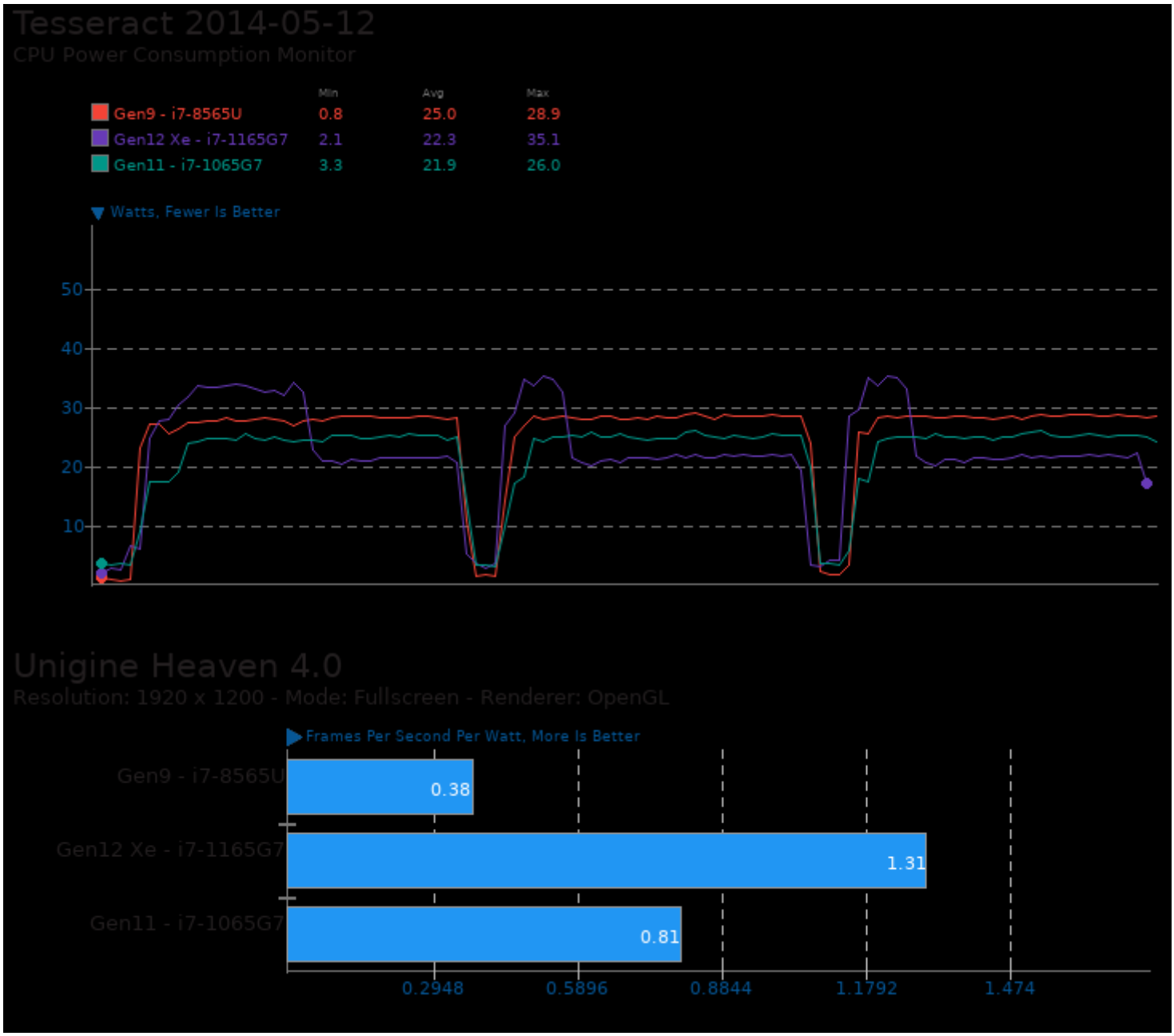
Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9

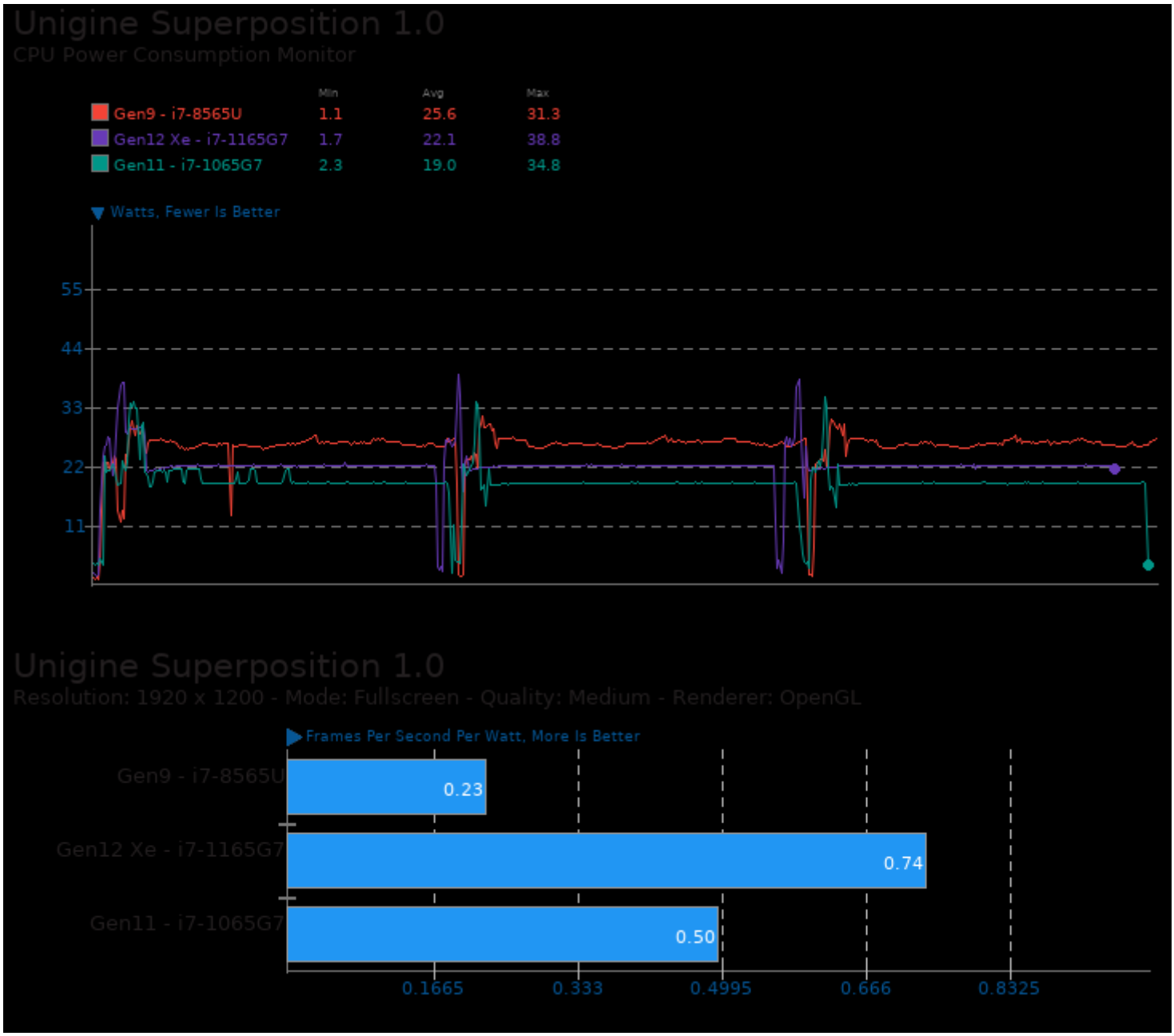


Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9




Unigine Superposition 1.0
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U
1.1
25.6
31.3
Gen12 Xe - i7-1165G7
1.7
22.1
38.8
Gen11 - i7-1065G7
2.3
19.0
34.8
Watts, Fewer Is Better
55
44
33
22
11
Unigine Superposition 1.0
Resolution: 1920 x 1200 - Mode: Fullscreen - Quality: Medium - Renderer: OpenGL
Frames Per Second Per Watt, More Is Better
Gen9 - i7-8565U
0.23
Gen12 Xe - i7-1165G7
0.74
Gen11 - i7-1065G7
0.50
0.1665
0.333
0.4995
0.666
0.8325

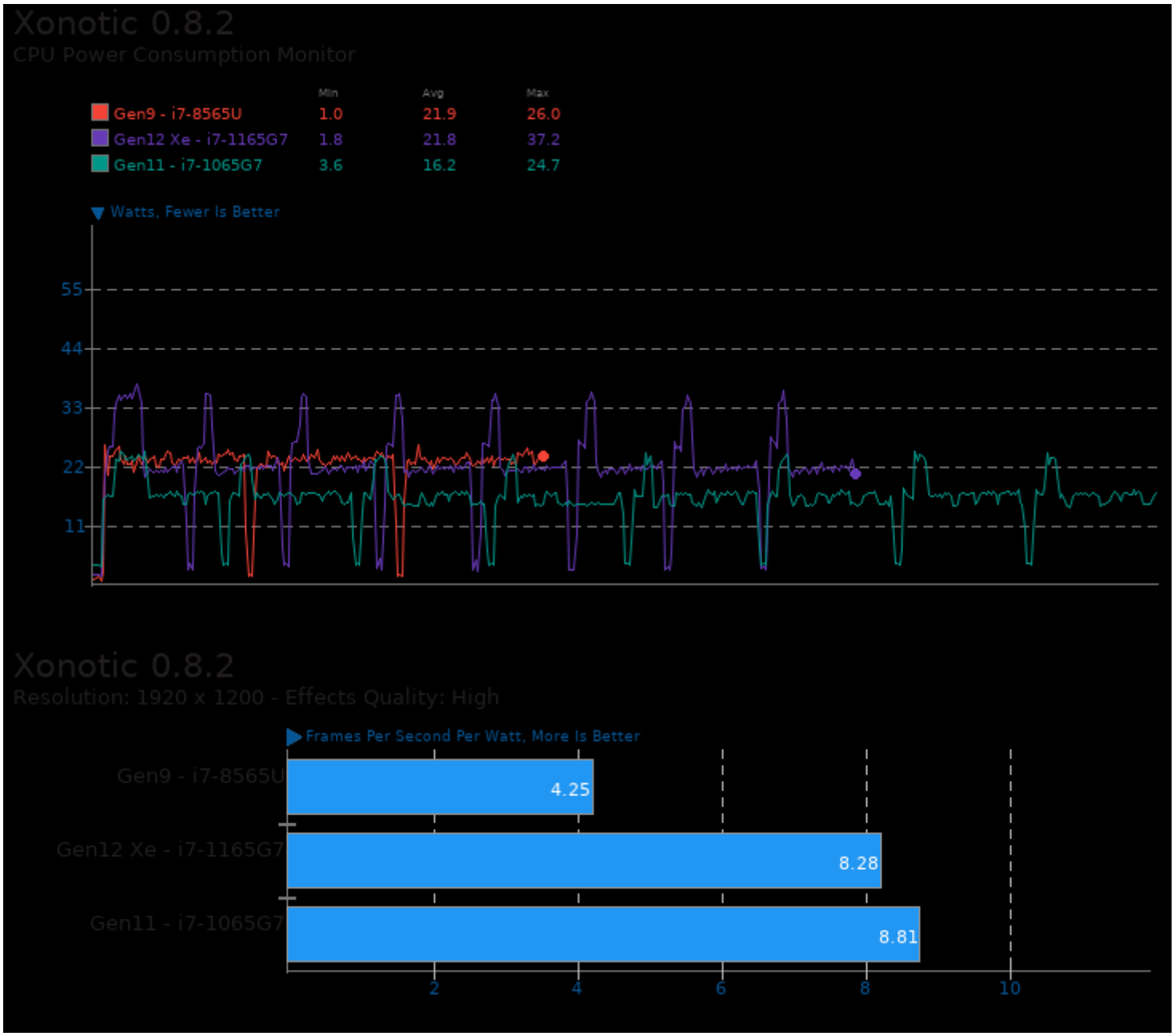
Tigerlake Xe Gen12 to Gen9



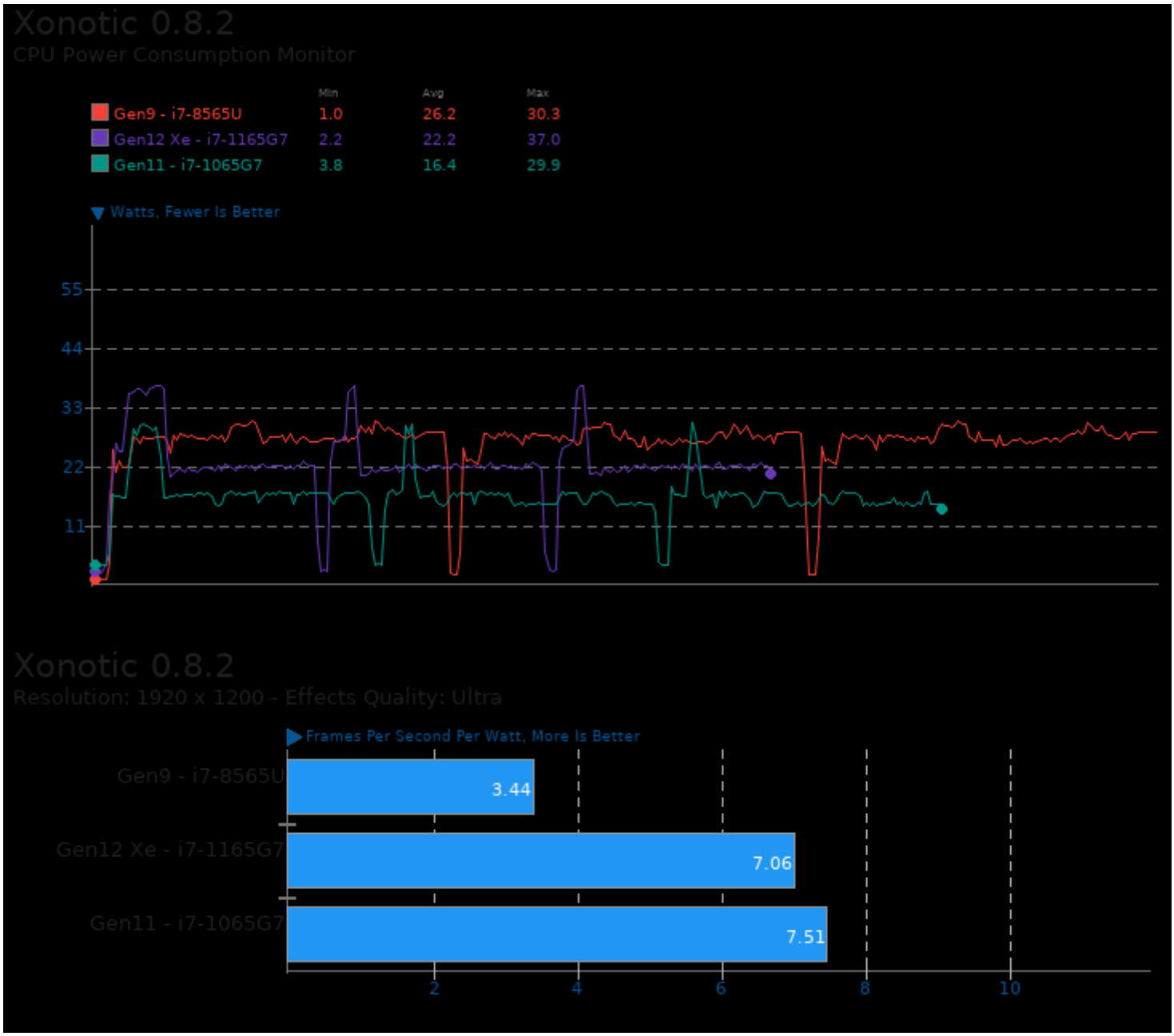
Tigerlake Xe Gen12 to Gen9



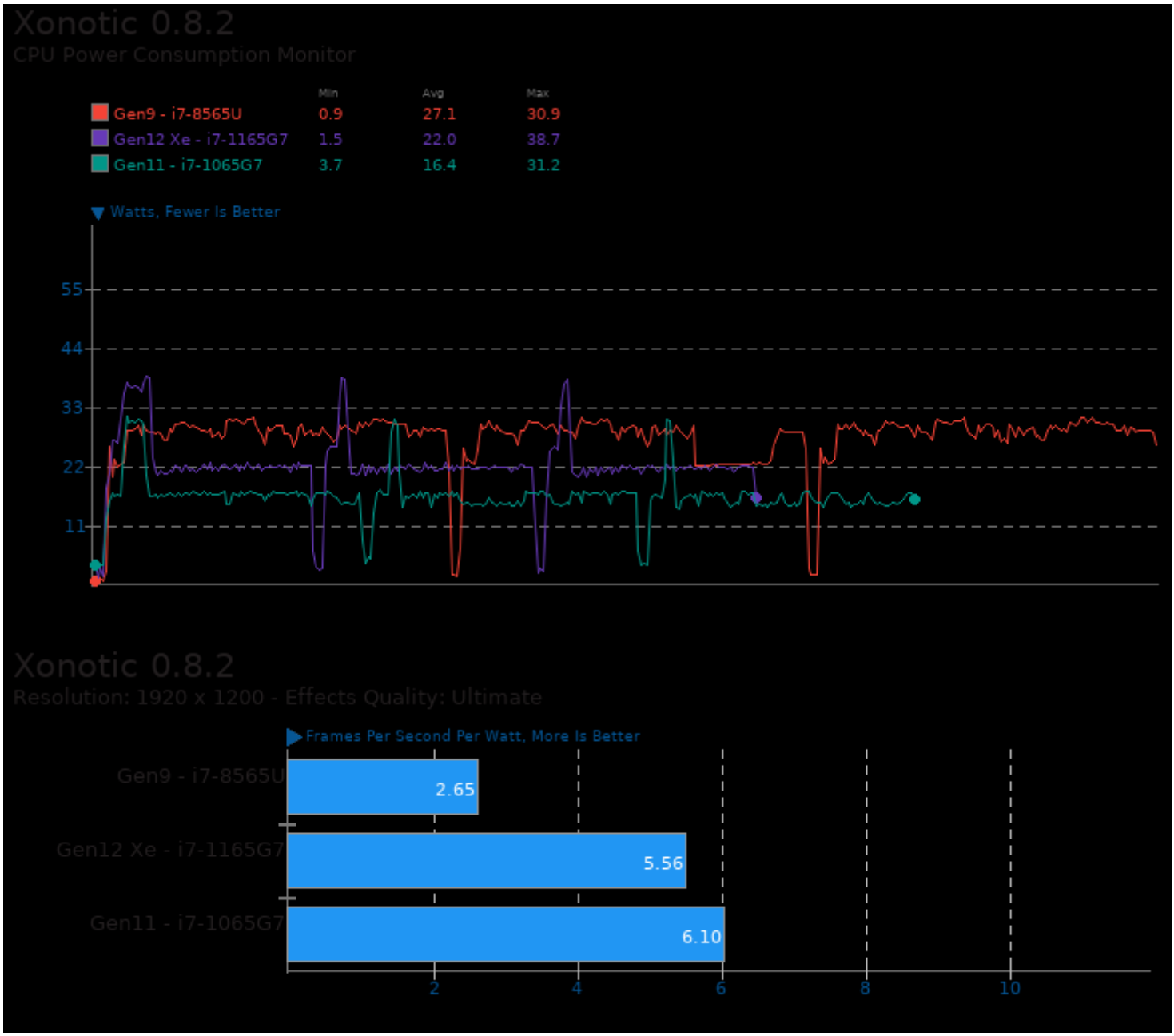
Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9



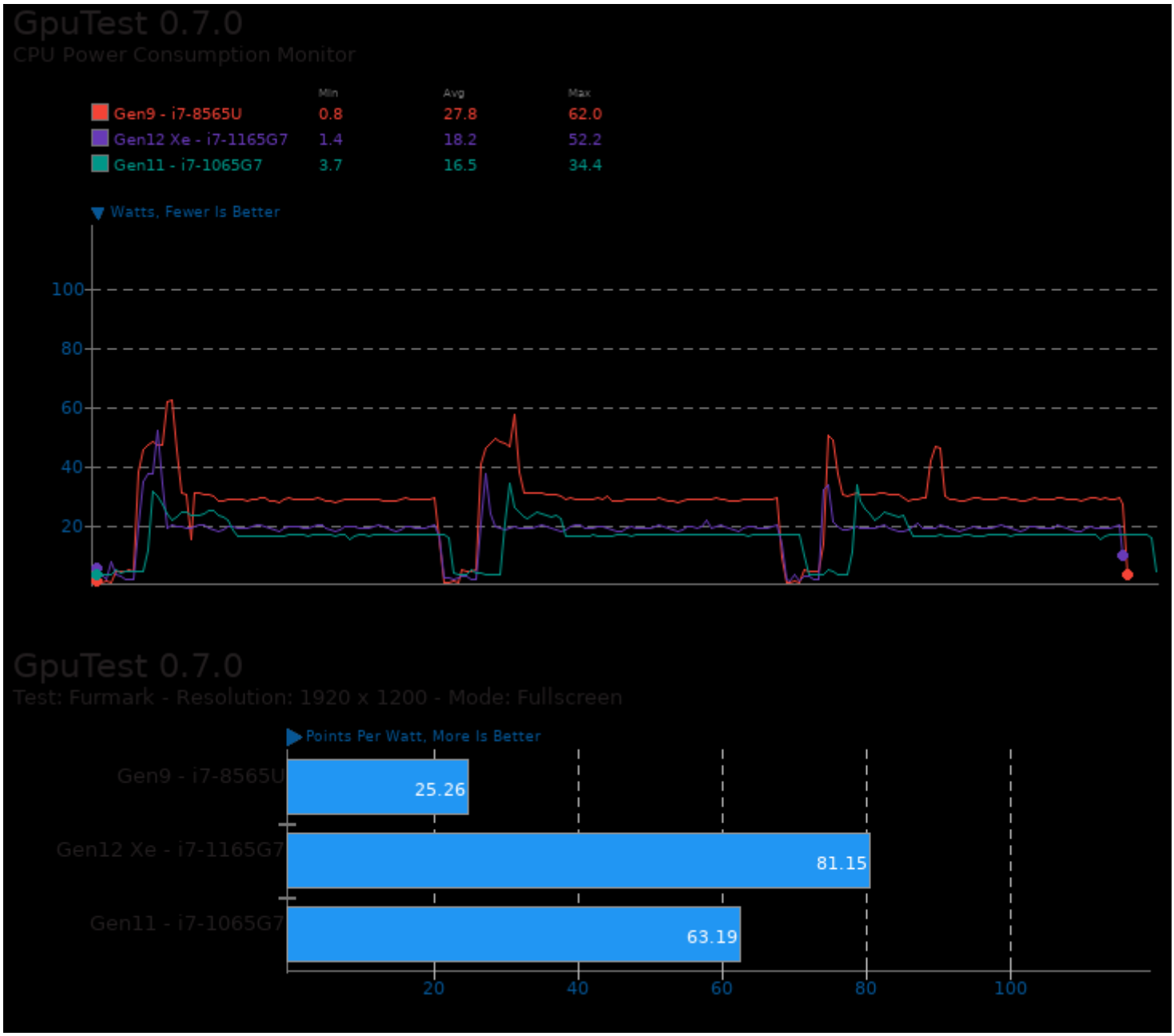
Tigerlake Xe Gen12 to Gen9



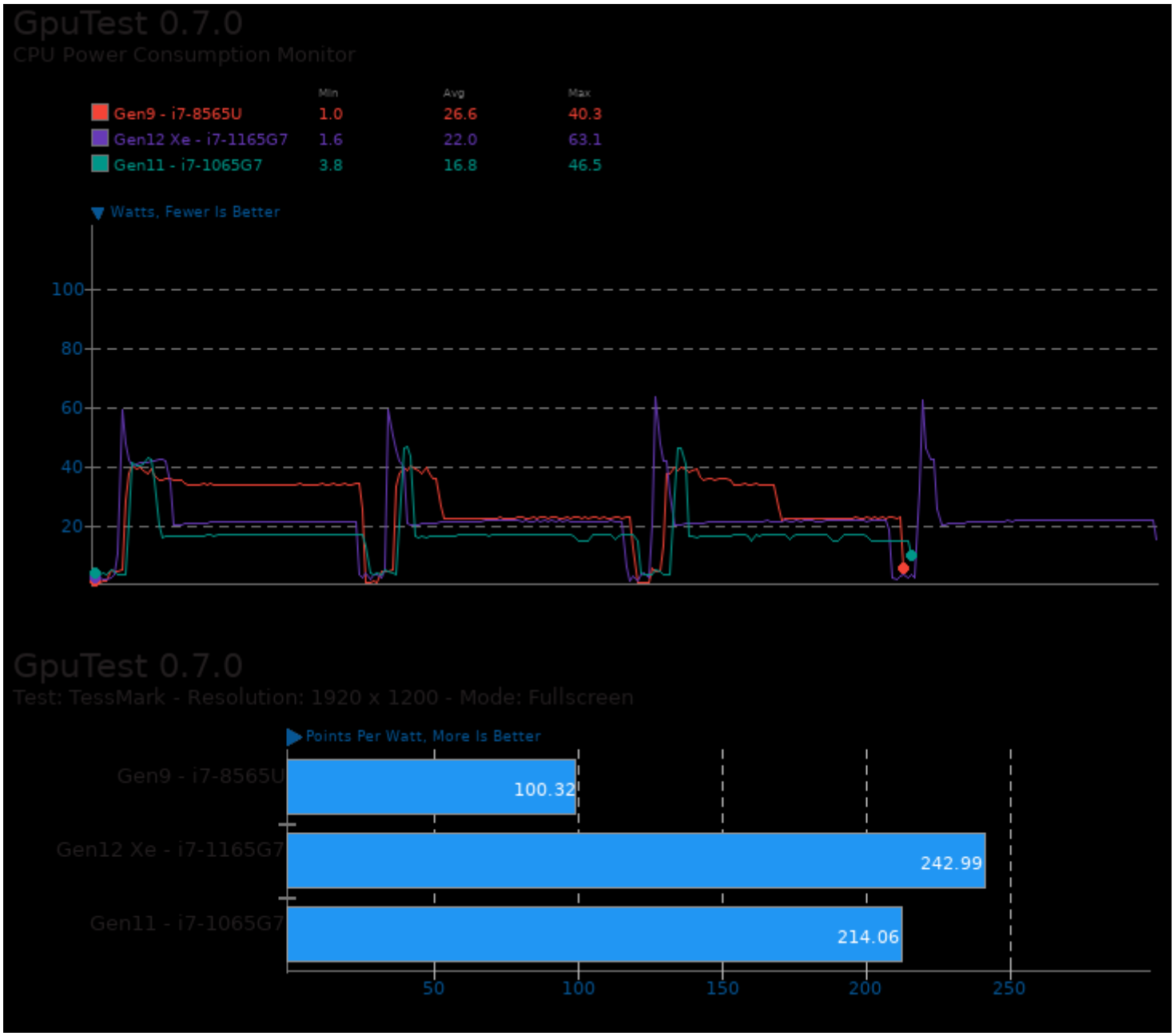
Tigerlake Xe Gen12 to Gen9



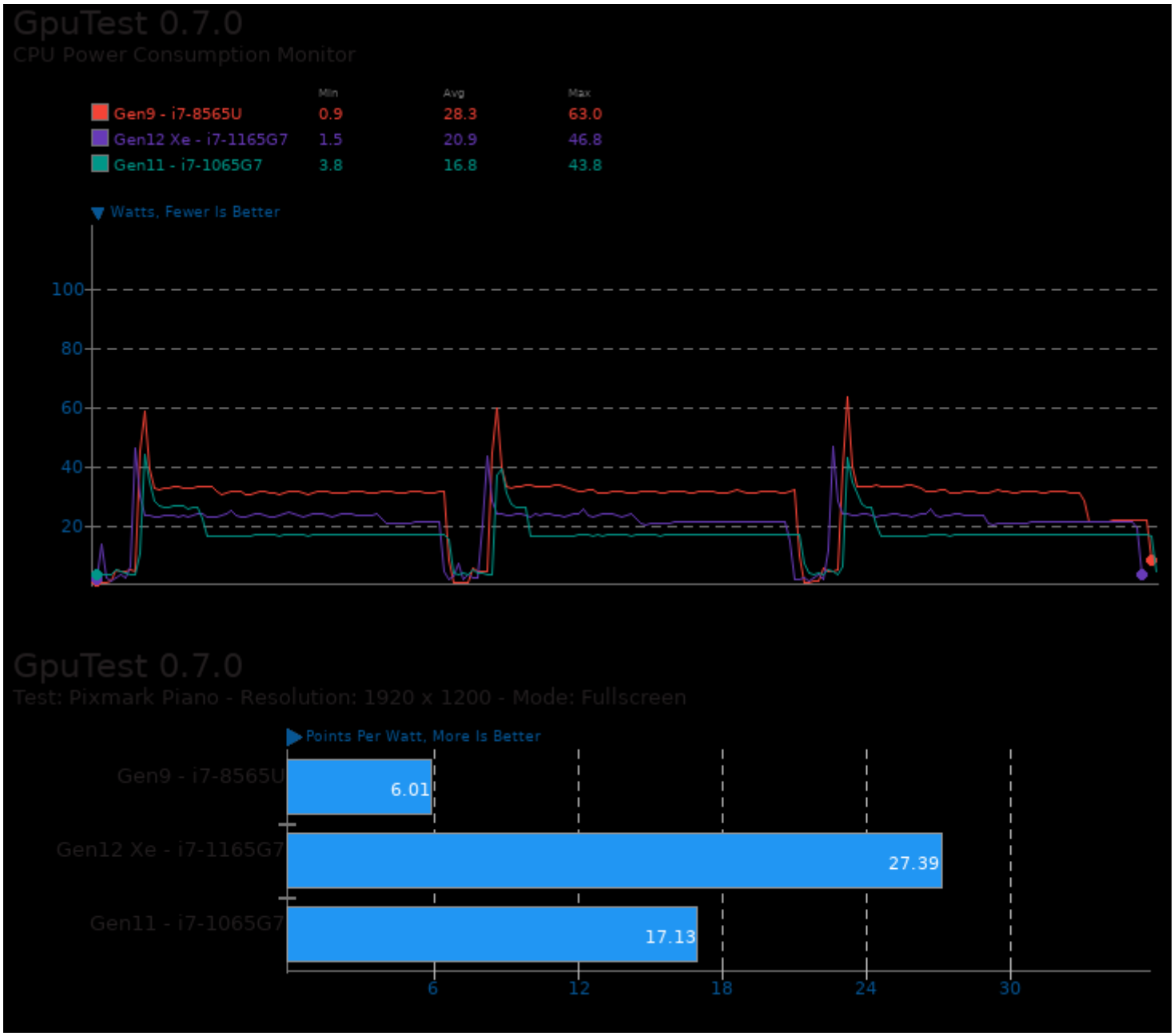
Tigerlake Xe Gen12 to Gen9



Tigerlake Xe Gen12 to Gen9



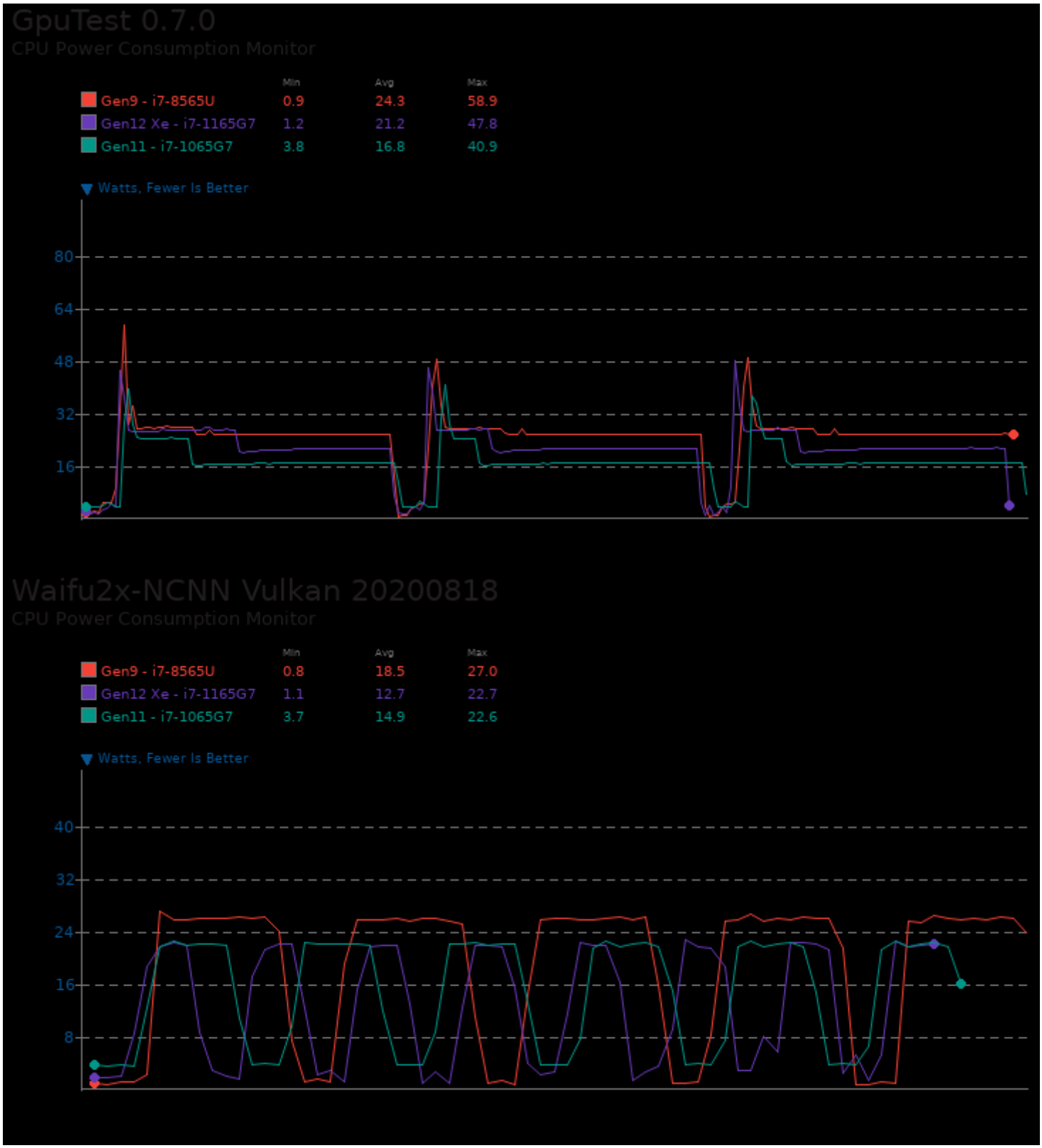
Tigerlake Xe Gen12 to Gen9

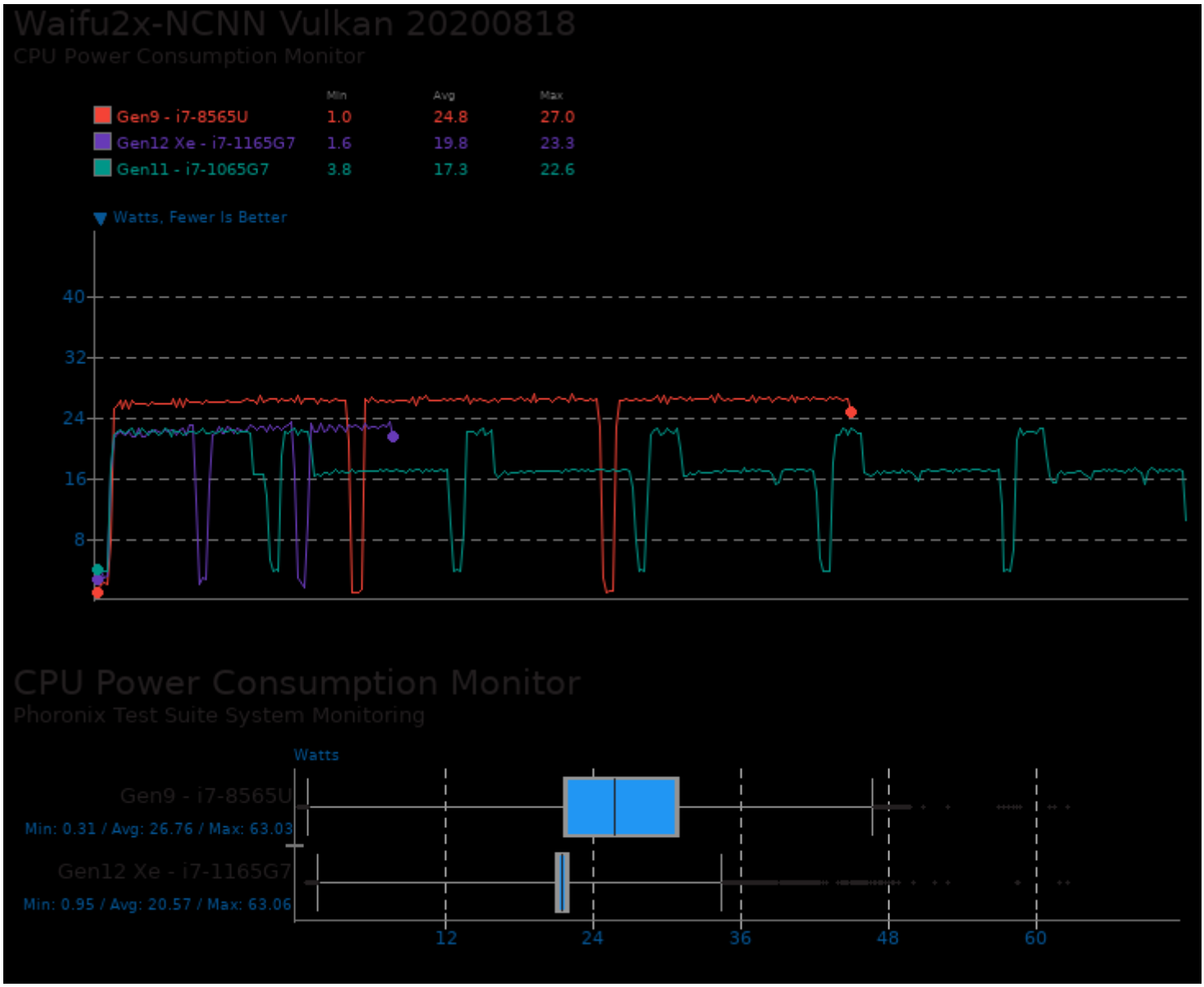


Tigerlake Xe Gen12 to Gen9

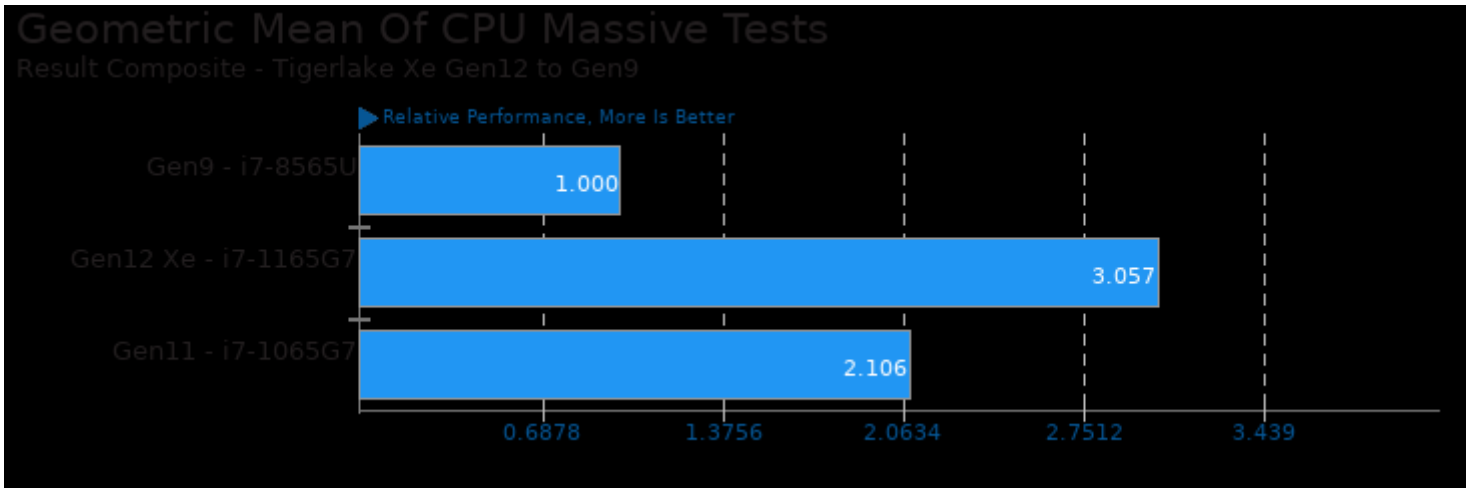


Tigerlake Xe Gen12 to Gen9

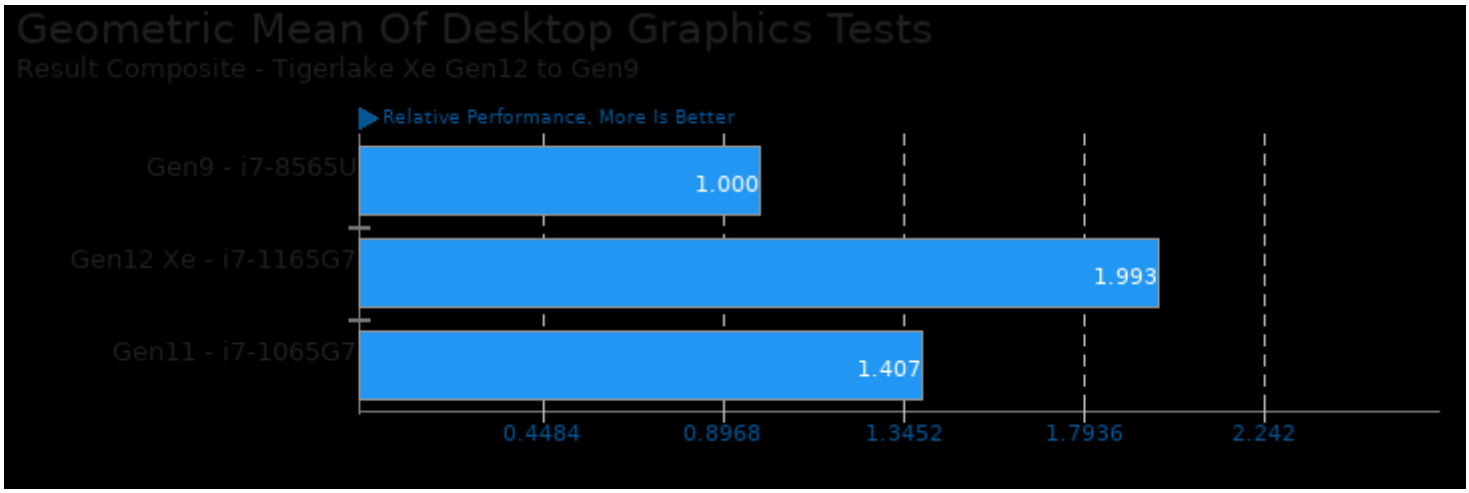



Waifu2x-NCNN Vulkan 20200818
CPU Power Consumption Monitor
Min
Avg
Max
Gen9 - i7-8565U 1.0 24.8 27.0
Gen12 Xe - i7-1165G7 1.6 19.8 23.3
Gen11 - i7-1065G7 3.8 17.3 22.6
Watts, Fewer Is Better
40
32
24
16
8
CPU Power Consumption Monitor
Phoronix Test Suite System Monitoring
Watts
Gen9 - i7-8565U
Min: 0.31 / Avg: 26.76 / Max: 63.03
Gen12 Xe - i7-1165G7
Min: 0.95 / Avg: 20.57 / Max: 63.06
12
24
36
48
60

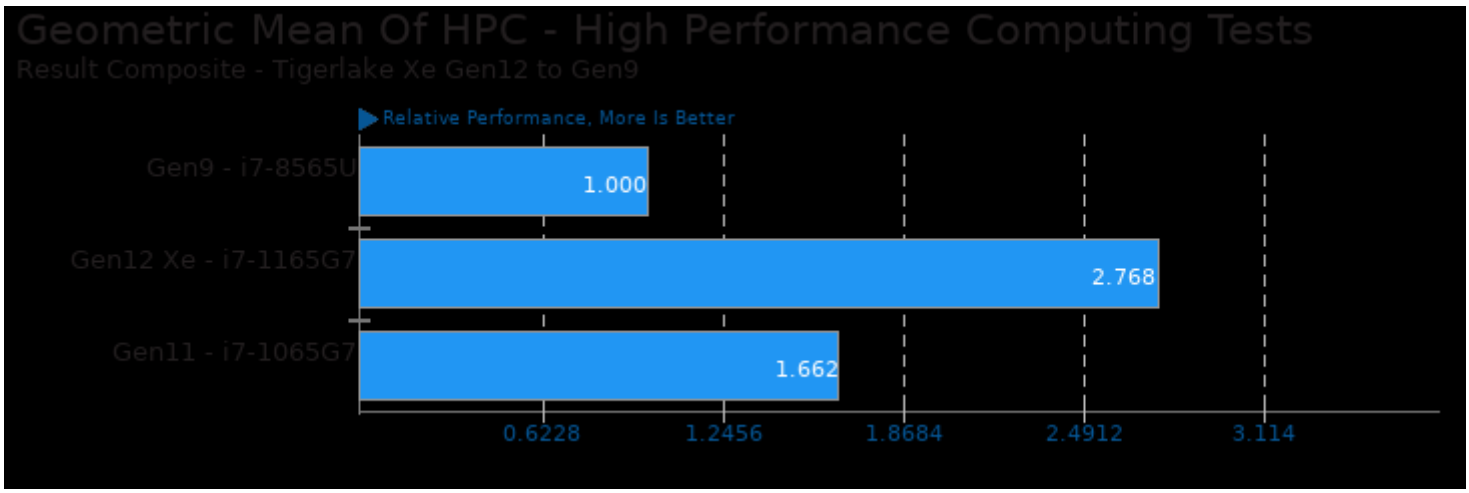
These geometric means are based upon test groupings / test suites for this result file.



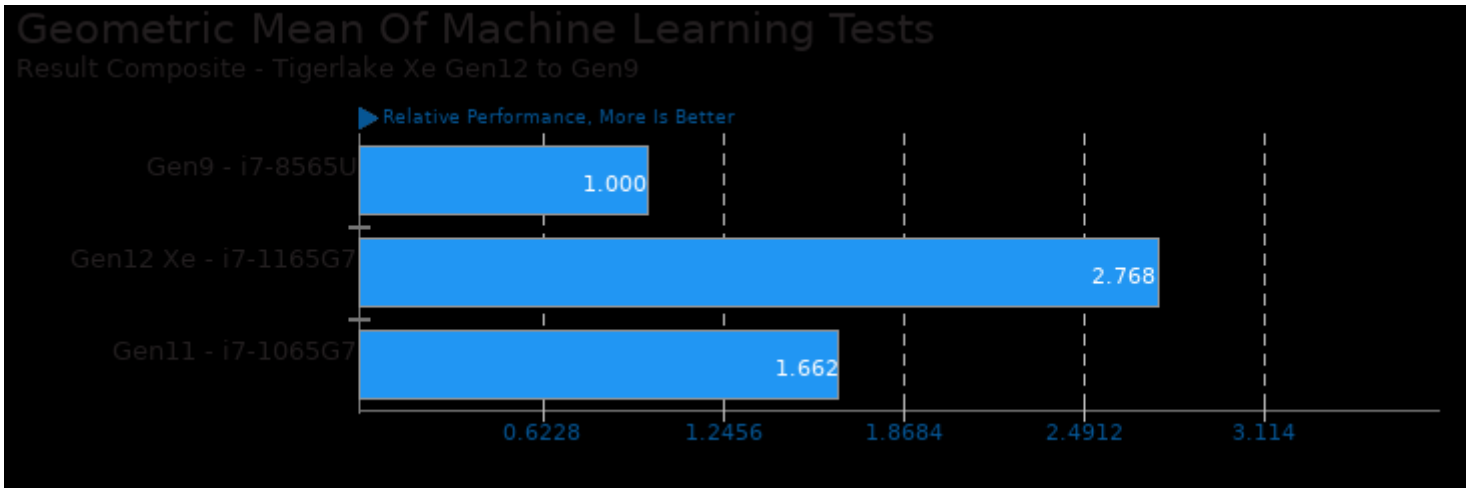
Geometric mean based upon tests: pts/lczero and pts/plaidml



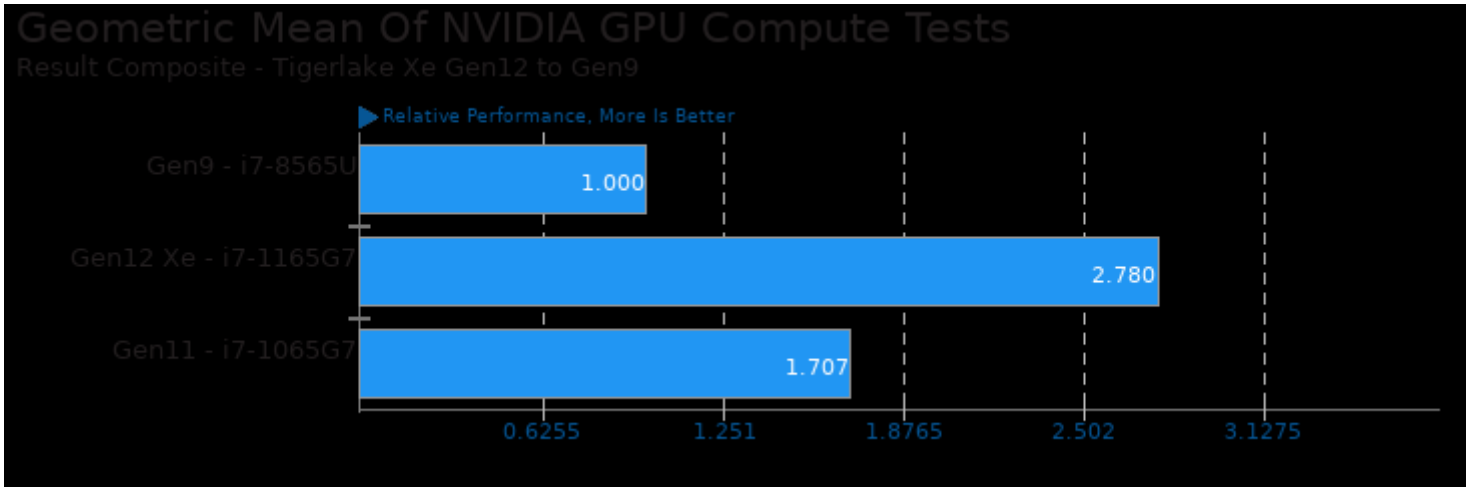
Geometric mean based upon tests: pts/xonotic, pts/tesseract, pts/unigine-valley and pts/unigine-heaven



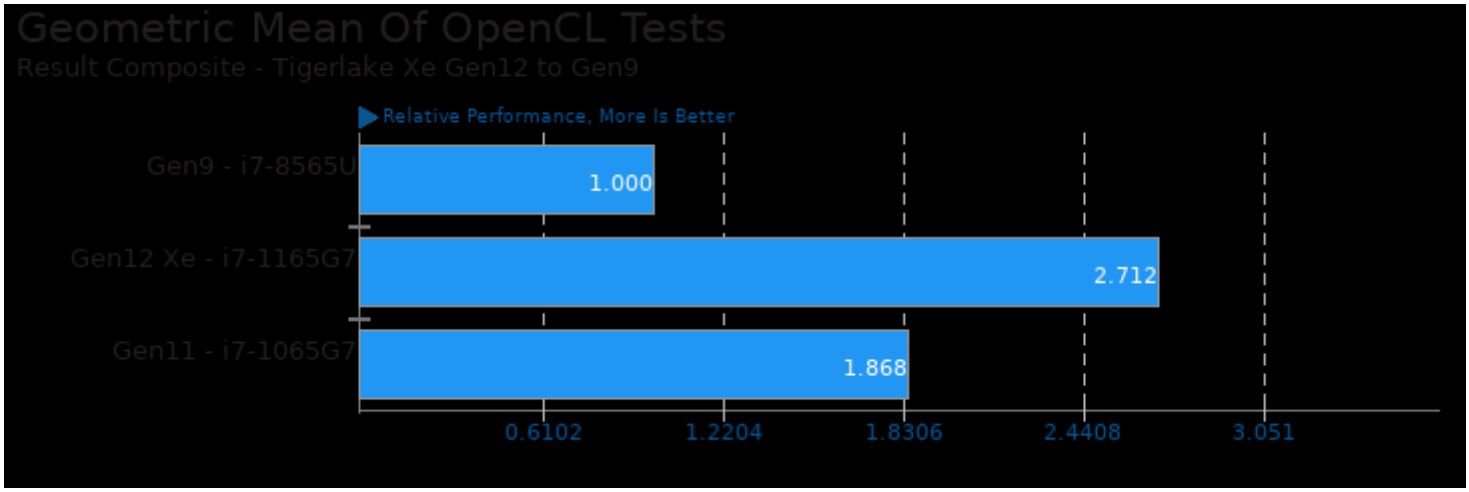
Geometric mean based upon tests: pts/ncnn, pts/shoc, pts/plaidml and pts/lczero



Geometric mean based upon tests: pts/ncnn, pts/shoc, pts/plaidml and pts/lczero

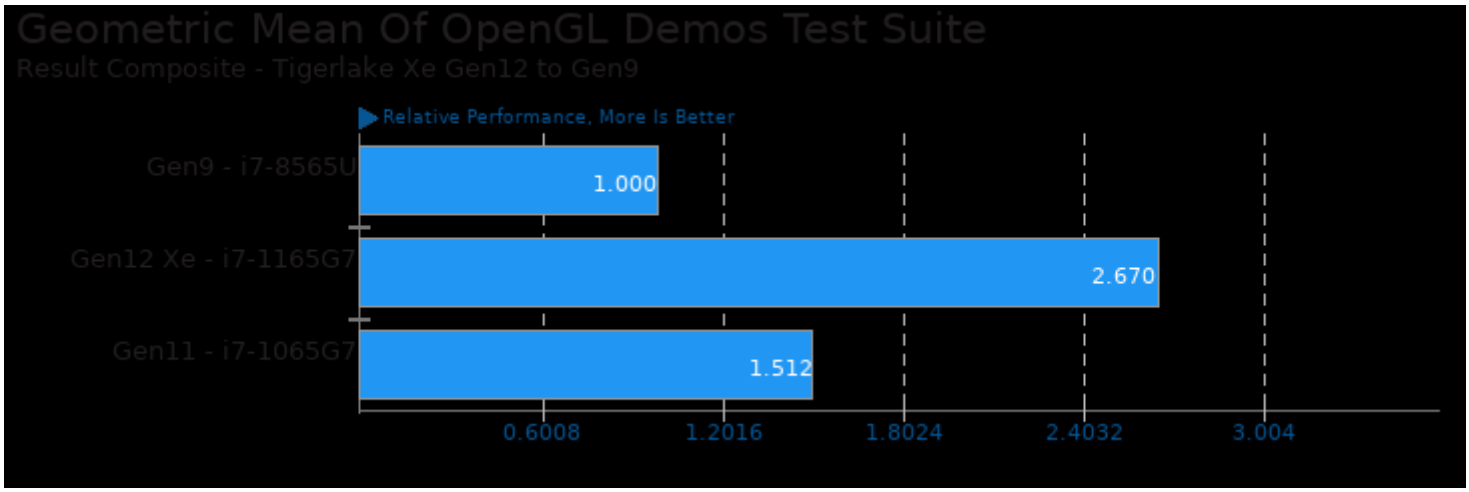


Geometric mean based upon tests: pts/clpeak, pts/financebench, pts/plaidml, pts/lczero, pts/cl-mem, pts/mandelgpu, pts/viennacl, pts/shoc, pts/ncnn, pts/realsr-ncnn and pts/waifu2x-ncnn

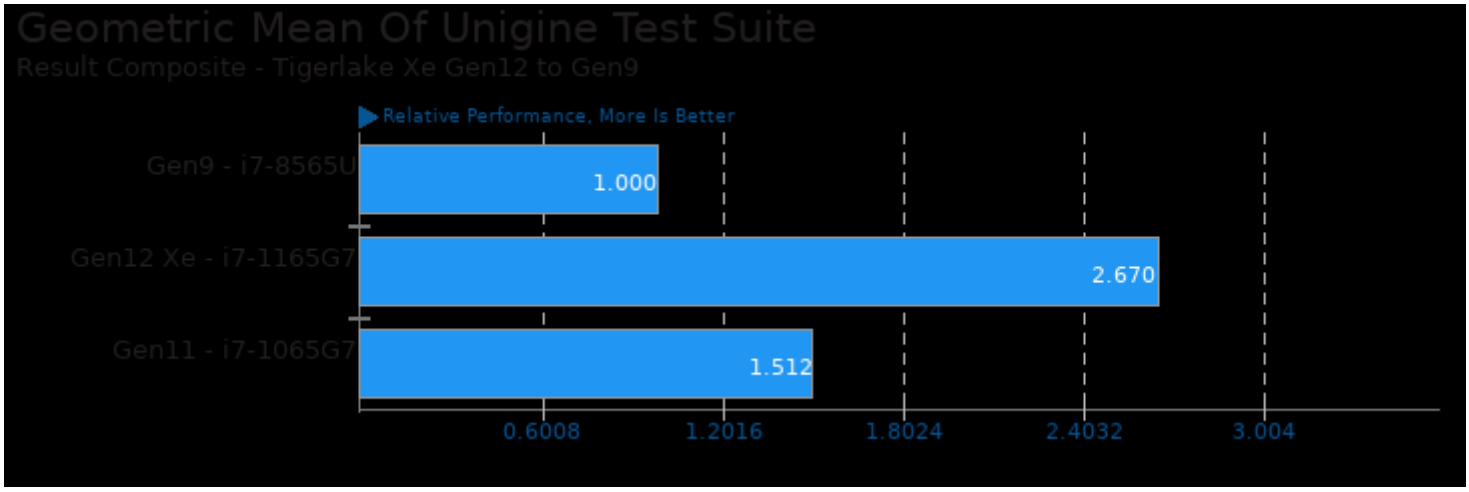


Geometric mean based upon tests: pts/juliagpu, pts/mandelgpu, pts/shoc, pts/cl-mem, pts/clpeak and pts/viennacl

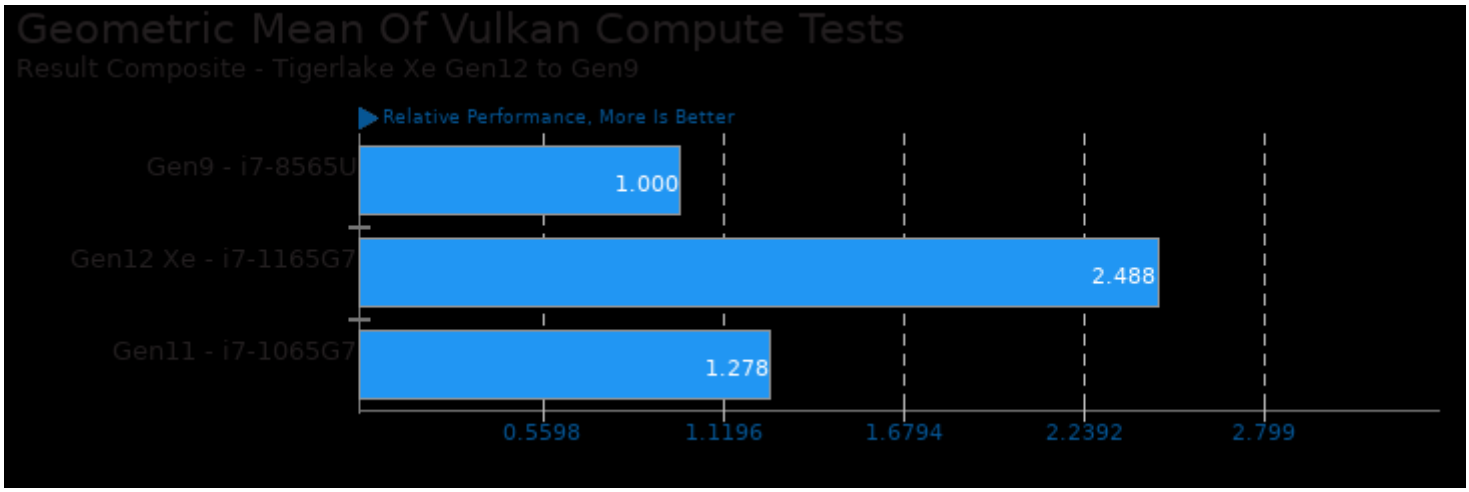
Tigerlake Xe Gen12 to Gen9



Geometric mean based upon tests: pts/unigine-valley, pts/unigine-heaven and pts/unigine-super



Geometric mean based upon tests: pts/unigine-valley, pts/unigine-heaven and pts/unigine-super



Geometric mean based upon tests: pts/ncnn, pts/realsr-ncnn and pts/waifu2x-ncnn

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 11:36.