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Vulkan Ray-Tracing GPUs

AMD using -PRO Vulkan driver extracted. Latest drivers for RTX 3080 Ti launch day testing for a future article.

Automated Executive Summary

RTX 3090 had the most wins, coming in first place for 84% of the tests.

Based on the geometric mean of all complete results, the fastest (RTX 3090) was 6.331x the speed of the slowest (RX 6700 XT).

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

Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query) at 21.168x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline) at 19.905x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query) at 19.585x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline) at 19.453x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query) at 16.421x

Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline) at 15.639x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query) at 15.267x
Quake II RTX (Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query) at 14.394x
Quake II RTX (Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline) at 14.286x
Quake II RTX (Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query) at 13.829x.

Test Systems:

RTX 2060 SUPER

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 2060 SUPER 8GB, Audio: NVIDIA TU106 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2070 SUPER

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 2070 SUPER 8GB, Audio: NVIDIA TU104 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug

--enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2080

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: Zotac NVIDIA GeForce RTX 2080 8GB, Audio: NVIDIA TU104 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2080 SUPER

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 2080 SUPER 8GB, Audio: NVIDIA TU104 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2080 Ti

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 2080 Ti 11GB, Audio: NVIDIA TU102 HD Audio, Monitor: ASUS VP28U,

Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

TITAN RTX

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA TITAN RTX 24GB, Audio: NVIDIA TU102 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3060

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: eVGA NVIDIA GeForce RTX 3060 12GB, Audio: NVIDIA Device 228e, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009

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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3060 Ti

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 3060 Ti 8GB, Audio: NVIDIA GA104 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3070

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 3070 8GB, Audio: NVIDIA GA104 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3080

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 3080 10GB, Audio: NVIDIA GA102 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168,

Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3080 Ti

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA Device 12GB, Audio: NVIDIA GA102 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3090

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: NVIDIA GeForce RTX 3090 24GB, Audio: NVIDIA GA102 HD Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.11.0-17-generic (x86_64), Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11, Display Driver: NVIDIA 465.31, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.3.116, Vulkan: 1.2.168, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6700 XT

RX 6800

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: AMD Radeon RX 6700/6700 XT / 6800M 12GB (2855/1000MHz), Audio: AMD Navi 21 HDMI Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.13.0-051300rc3daily20210525-generic (x86_64) 20210524, Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11 + Wayland, OpenGL: 4.6 Mesa 21.2.0-devel (git-b8d59e6 2021-05-27 hirsute-oibaf-ppa) (LLVM 12.0.0), Vulkan: 1.2.169, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6800 XT

Processor: AMD Ryzen 9 5900X 12-Core @ 3.70GHz (12 Cores / 24 Threads), Motherboard: ASUS ROG CROSSHAIR VIII HERO (3402 BIOS), Chipset: AMD Starship/Matisse, Memory: 16GB, Disk: 1000GB Sabrent Rocket 4.0 Plus + 2000GB, Graphics: AMD Radeon RX 6800/6800 XT / 6900 16GB (2575/1000MHz), Audio: AMD Navi 21 HDMI Audio, Monitor: ASUS VP28U, Network: Realtek RTL8125 2.5GbE + Intel I211

OS: Ubuntu 21.04, Kernel: 5.13.0-051300rc3daily20210525-generic (x86_64) 20210524, Desktop: GNOME Shell 3.38.4, Display Server: X Server 1.20.11 + Wayland, OpenGL: 4.6 Mesa 21.2.0-devel (git-b8d59e6 2021-05-27 hirsute-oibaf-ppa) (LLVM 12.0.0), Vulkan: 1.2.169, Compiler: GCC 10.3.0 + CUDA 11.3, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
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++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa201009
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 Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Phoronix Test Suite

Vulkan Ray-Tracing GPUs

	RTX 2060 SUPER	RTX 2070 SUPER	RTX 2080	RTX 2080 SUPER	RTX 2080 Ti	TITAN RTX	RTX 3060	RTX 3060 Ti	RTX 3070	RTX 3080	RTX 3080 Ti	RTX 3090	RX 6700 XT	RX 6800	RX 6800 XT
Ray Tracing In Vulkan - 1920 x 1080 - Cornell Box (FPS/Watt)	0.391	0.427	0.4	0.451	0.443	0.428	0.48	0.477	**0.494**	0.415	0.43	0.458	**0.271**		0.293
Normalized	79.15%	86.44%	80.97%	91.3%	89.68%	86.64%	97.17%	96.56%	100%	84.01%	87.04%	92.71%	54.86%		59.31%
Ray Tracing In Vulkan - 2560 x 1440 - Cornell Box (FPS/Watt)	0.224	0.241	0.227	0.255	0.253	0.247	0.271	0.27	**0.278**	0.239	0.245	0.263	**0.151**		0.164
Normalized	80.58%	86.69%	81.65%	91.73%	91.01%	88.85%	97.48%	97.12%	100%	85.97%	88.13%	94.6%	54.32%		58.99%
Ray Tracing In Vulkan - 1920 x 1080 - Cornell Box (FPS)	51.7367	61.7613	67.9629	74.4112	100.896	105.884	48.0800	67.9096	80.5794	116.747	131.930	**139.8049**	**40.5813**	40.7360	65.0329
Normalized	36.99%	44.16%	48.6%	53.21%	72.15%	75.71%	34.38%	48.56%	57.62%	83.48%	94.34%	100%	29.02%	29.13%	46.5%
Standard Deviation	0.1%	0.1%	0.6%	0.5%	0.2%	0.2%	0.1%	0.2%	0.6%	0.4%	0.4%	0.1%	0.2%	0.1%	0.5%
Ray Tracing In Vulkan - 2560 x 1440 - Cornell Box (FPS)	29.7683	35.2480	38.8304	42.7626	57.8643	60.7656	27.4544	38.4762	45.9271	66.8571	75.4047	**79.8735**	**22.3557**	22.5687	36.9903
Normalized	37.27%	44.13%	48.61%	53.54%	72.44%	76.08%	34.37%	48.17%	57.5%	83.7%	94.41%	100%	27.99%	28.26%	46.31%
Standard Deviation	0.1%	0.2%	0.5%	0.3%	0.3%	0.3%	0.1%	0.3%	0.1%	0.4%	0.3%	0.2%	0.1%	0.1%	0.1%
Ray Tracing In Vulkan - 3840 x 2160 - Cornell Box (FPS)	14.1657	16.7750	18.5197	20.2455	27.4695	28.7104	13.1073	18.4452	21.7784	31.5017	35.5543	**37.6387**	**10.4187**	10.4551	17.6418
Normalized	37.64%	44.57%	49.2%	53.79%	72.98%	76.28%	34.82%	49.01%	57.86%	83.69%	94.46%	100%	27.68%	27.78%	46.87%
Standard Deviation	0%	0%	0.5%	0.4%	0.3%	0.2%	0.1%	0.3%	0.3%	0%	0.5%	0%	0.2%	0.1%	0%
Ray Tracing In Vulkan - 1920 x 1080 - Cornell Box + Lucy (FPS)	21.7712	24.5359	24.8367	25.6074	37.5068	39.5615	19.1547	32.5427	38.7595	55.8391	63.6447	**66.8811**	**10.0990**	12.1851	24.2983
Normalized	32.55%	36.69%	37.14%	38.29%	56.08%	59.15%	28.64%	48.66%	57.95%	83.49%	95.16%	100%	15.1%	18.22%	36.33%
Standard Deviation	0.2%	0.1%	0.6%	0.1%	0%	0.3%	0.2%	0.3%	0.3%	0.5%	0.3%	0.2%	0.4%	3.9%	0.1%

Vulkan Ray-Tracing GPUs

Ray Tracing In Vulkan - 2560 x 1440 - Cornell Box + Lucy (FPS)	12.4704	14.1206	14.3374	14.7670	21.6865	22.9320	11.0202	18.7284	22.3218	32.0670	36.4578	**38.3542**	**5.802 87**	6.95323	13.4708
Normalized	32.51%	36.82%	37.38%	38.5%	56.54%	59.79%	28.73%	48.83%	58.2%	83.61%	95.06%	100%	15.13%	18.13%	35.12%
Standard Deviation	0.1%	0.2%	0.3%	0.3%	0.1%	0%	0.3%	0.1%	0.2%	0%	0.4%	0.2%	1.3%	2.5%	0.1%
Ray Tracing In Vulkan - 3840 x 2160 - Cornell Box + Lucy (FPS)	5.98972	6.78420	6.93396	7.13569	10.5350	11.1178	5.33619	8.99226	10.7514	15.6561	17.7738	**18.7325**	**2.734 84**	3.36229	6.49872
Normalized	31.98%	36.22%	37.02%	38.09%	56.24%	59.35%	28.49%	48%	57.39%	83.58%	94.88%	100%	14.6%	17.95%	34.69%
Standard Deviation	0.1%	0.2%	0.1%	0.2%	0.1%	0.3%	0.1%	0.1%	0.2%	0.2%	0.4%	0.3%	0.4%	1.3%	0.1%
Ray Tracing In Vulkan - 1920 x 1080 - L.I.O.W	23.4096	26.3363	27.2855	28.4826	40.4051	42.4581	23.6961	33.1762	39.0793	55.7513	63.5033	**66.5951**	**21.0299**	21.3842	34.5491
Normalized	35.15%	39.55%	40.97%	42.77%	60.67%	63.76%	35.58%	49.82%	58.68%	83.72%	95.36%	100%	31.58%	32.11%	51.88%
Standard Deviation	0.2%	0.1%	0.2%	0.2%	0.3%	0.3%	0.1%	0.2%	0.1%	0.3%	0.4%	0.2%	0.2%	0.2%	0.4%
Ray Tracing In Vulkan - 2560 x 1440 - L.I.O.W	13.8421	15.7067	16.3647	17.2075	24.4245	25.6626	13.7147	19.1567	22.6182	32.0165	36.3213	**38.1994**	**11.7402**	11.8502	20.8010
Normalized	36.24%	41.12%	42.84%	45.05%	63.94%	67.18%	35.9%	50.15%	59.21%	83.81%	95.08%	100%	30.73%	31.02%	54.45%
Standard Deviation	0.2%	0.3%	0.3%	0.4%	0.3%	0.2%	0.1%	0%	0.1%	0.2%	0.5%	0.2%	1.7%	0.3%	0.2%
Ray Tracing In Vulkan - 3840 x 2160 - L.I.O.W	6.90370	7.96145	8.37899	8.85032	12.5081	13.1575	6.70692	9.45074	11.2483	16.0479	18.1551	**19.1287**	5.855 22	**5.854 00**	10.6277
Normalized	36.09%	41.62%	43.8%	46.27%	65.39%	68.78%	35.06%	49.41%	58.8%	83.89%	94.91%	100%	30.61%	30.6%	55.56%
Standard Deviation	0.1%	0.4%	0.3%	0.4%	0.2%	0.4%	0%	0%	0%	0.2%	0.4%	0.1%	0.5%	0.2%	0.2%
Ray Tracing In Vulkan - 1920 x 1080 - P.I.O.W (FPS)	33.9689	40.2085	44.4128	48.4484	64.9526	67.9181	**26.1609**	36.5638	43.5200	63.6863	71.7535	76.3579	49.9422	50.1222	**83.0670**
Normalized	40.89%	48.4%	53.47%	58.32%	78.19%	81.76%	31.49%	44.02%	52.39%	76.67%	86.38%	91.92%	60.12%	60.34%	100%
Standard Deviation	0.1%	0.4%	0.1%	0.1%	0.5%	0%	0.2%	0.1%	0.5%	0.2%	0.4%	0.2%	0.1%	0.3%	0.3%

Vulkan Ray-Tracing GPUs

Ray Tracing In Vulkan - 2560 x 1440 - P.I.O.W (FPS)	19.38 42	22.89 77	25.30 20	27.65 93	36.83 91	38.59 95	**14.96 18**	20.92 60	24.74 33	35.91 37	40.59 35	43.23 54	27.23 98	27.48 72	**47.15 89**
Normalized	41.1%	48.55%	53.65%	58.65%	78.12%	81.85%	31.73%	44.37%	52.47%	76.15%	86.08%	91.68%	57.76%	58.29%	100%
Standard Deviation	0.2%	0.4%	0.2%	0.1%	0.3%	0.3%	0.2%	0%	0.2%	0.1%	0.5%	0.3%	0.1%	0.1%	0.2%
Ray Tracing In Vulkan - 3840 x 2160 - P.I.O.W (FPS)	9.206 30	10.91 71	12.08 84	13.20 94	17.75 24	18.54 58	**7.083 06**	9.995 70	11.86 99	17.32 96	19.61 64	20.77 17	13.12 51	13.19 70	**22.74 45**
Normalized	40.48%	48%	53.15%	58.08%	78.05%	81.54%	31.14%	43.95%	52.19%	76.19%	86.25%	91.33%	57.71%	58.02%	100%
Standard Deviation	0.5%	0.4%	0.1%	0%	0.3%	0.2%	0.1%	0.1%	0%	0%	0.6%	0%	0.1%	0%	0.1%
Ray Tracing In Vulkan - 1920 x 1080 - R.T.I.O.W (FPS)	33.27 69	39.22 63	43.60 14	47.53 28	64.14 00	67.04 14	**25.55 58**	35.73 15	42.45 61	62.17 10	70.56 53	74.53 93	52.89 12	53.30 42	**83.91 94**
Normalized	39.65%	46.74%	51.96%	56.64%	76.43%	79.89%	30.45%	42.58%	50.59%	74.08%	84.09%	88.82%	63.03%	63.52%	100%
Standard Deviation	0%	0.5%	0.5%	0.1%	0.6%	0.2%	0.1%	0.1%	0.2%	0.4%	0.4%	0.2%	0.3%	0.1%	0.3%
Ray Tracing In Vulkan - 3840 x 2160 - Cornell Box (FPS/Watt)	0.106	0.114	0.108	0.121	0.121	0.117	0.129	0.128	**0.132**	0.114	0.115	0.125	**0.07**		0.078
Normalized	80.3%	86.36%	81.82%	91.67%	91.67%	88.64%	97.73%	96.97%	100%	86.36%	87.12%	94.7%	53.03%		59.09%
Ray Tracing In Vulkan - 1920 x 1080 - Cornell Box + Lucy (FPS/Watt)	0.142	0.15	0.142	0.153	0.165	0.161	0.157	0.189	0.202	0.198	0.205	**0.219**	**0.086**		0.109
Normalized	64.84%	68.49%	64.84%	69.86%	75.34%	73.52%	71.69%	86.3%	92.24%	90.41%	93.61%	100%	39.27%		49.77%
Ray Tracing In Vulkan - 2560 x 1440 - Cornell Box + Lucy (FPS/Watt)	0.081	0.086	0.081	0.087	0.095	0.093	0.089	0.108	0.117	0.114	0.118	**0.125**	**0.048**		0.061
Normalized	64.8%	68.8%	64.8%	69.6%	76%	74.4%	71.2%	86.4%	93.6%	91.2%	94.4%	100%	38.4%		48.8%

Vulkan Ray-Tracing GPUs

Ray Tracing In Vulkan - 3840 x 2160 - Cornell Box + Lucy (FPS/Watt)	0.039	0.041	0.039	0.041	0.046	0.045	0.043	0.052	0.056	0.055	0.058	**0.061**	**0.023**	0.029
Normalized	63.93%	67.21%	63.93%	67.21%	75.41%	73.77%	70.49%	85.25%	91.8%	90.16%	95.08%	100%	37.7%	47.54%
Ray Tracing In Vulkan - 1920 x 1080 - L.I.O.W (FPS/Watt)	0.155	0.164	0.155	0.167	0.178	0.172	0.189	0.195	0.207	0.198	0.206	**0.218**	**0.141**	0.156
Normalized	71.1%	75.23%	71.1%	76.61%	81.65%	78.9%	86.7%	89.45%	94.95%	90.83%	94.5%	100%	64.68%	71.56%
Ray Tracing In Vulkan - 2560 x 1440 - L.I.O.W (FPS/Watt)	0.091	0.096	0.091	0.097	0.107	0.104	0.111	0.114	0.121	0.115	0.118	**0.125**	**0.083**	0.093
Normalized	72.8%	76.8%	72.8%	77.6%	85.6%	83.2%	88.8%	91.2%	96.8%	92%	94.4%	100%	66.4%	74.4%
Ray Tracing In Vulkan - 3840 x 2160 - L.I.O.W (FPS/Watt)	0.045	0.047	0.046	0.049	0.055	0.053	0.055	0.057	0.06	0.058	0.059	**0.063**	**0.04**	0.048
Normalized	71.43%	74.6%	73.02%	77.78%	87.3%	84.13%	87.3%	90.48%	95.24%	92.06%	93.65%	100%	63.49%	76.19%
Ray Tracing In Vulkan - 2560 x 1440 - P.I.O.W (FPS/Watt)	0.138	0.145	0.14	0.154	0.163	0.157	0.155	0.155	0.162	**0.133**	0.135	0.143	0.191	**0.212**
Normalized	65.09%	68.4%	66.04%	72.64%	76.89%	74.06%	73.11%	73.11%	76.42%	62.74%	63.68%	67.45%	90.09%	100%
Ray Tracing In Vulkan - 3840 x 2160 - P.I.O.W (FPS/Watt)	0.065	0.069	0.066	0.073	0.079	0.075	0.074	0.074	0.077	**0.064**	0.065	0.069	0.091	**0.101**
Normalized	64.36%	68.32%	65.35%	72.28%	78.22%	74.26%	73.27%	73.27%	76.24%	63.37%	64.36%	68.32%	90.1%	100%
Ray Tracing In Vulkan - 1920 x 1080 - R.T.I.O.W (FPS/Watt)	0.24	0.255	0.24	0.271	0.28	0.272	0.271	0.271	0.282	0.233	**0.229**	0.246	0.356	**0.375**
Normalized	64%	68%	64%	72.27%	74.67%	72.53%	72.27%	72.27%	75.2%	62.13%	61.07%	65.6%	94.93%	100%

Vulkan Ray-Tracing GPUs

Ray Tracing In Vulkan - 2560 x 1440 - R.T.I.O.W (FPS/Watt)	0.136	0.145	0.135	0.154	0.159	0.155	0.154	0.154	0.159	0.132	**0.13**	0.141	0.196		**0.217**
Normalized	62.67%	66.82%	62.21%	70.97%	73.27%	71.43%	70.97%	70.97%	73.27%	60.83%	59.91%	64.98%	90.32%		100%
Ray Tracing In Vulkan - 3840 x 2160 - R.T.I.O.W (FPS/Watt)	0.064	0.068	0.064	0.073	0.076	0.074	0.073	0.072	0.076	**0.063**	**0.063**	0.067	0.092		**0.103**
Normalized	62.14%	66.02%	62.14%	70.87%	73.79%	71.84%	70.87%	69.9%	73.79%	61.17%	61.17%	65.05%	89.32%		100%
Ray Tracing In Vulkan - 2560 x 1440 - R.T.I.O.W (FPS)	19.02 30	22.38 29	24.81 63	27.04 00	36.14 65	37.84 04	**14.58 82**	20.44 48	24.16 91	35.17 96	39.93 93	42.20 19	28.84 90	29.08 96	**48.43 07**
Normalized	39.28%	46.22%	51.24%	55.83%	74.64%	78.13%	30.12%	42.21%	49.9%	72.64%	82.47%	87.14%	59.57%	60.06%	100%
Standard Deviation	0%	0.5%	0.5%	0.1%	0.3%	0.3%	0.1%	0%	0.1%	0.1%	0.2%	0.2%	0.2%	0%	0.4%
Ray Tracing In Vulkan - 1920 x 1080 - P.I.O.W (FPS/Watt)	0.239	0.256	0.245	0.272	0.285	0.275	0.274	0.271	0.285	**0.234**	0.235	0.251	0.349		**0.373**
Normalized	64.08%	68.63%	65.68%	72.92%	76.41%	73.73%	73.46%	72.65%	76.41%	62.73%	63%	67.29%	93.57%		100%
Ray Tracing In Vulkan - 3840 x 2160 - R.T.I.O.W (FPS)	9.033 27	10.66 57	11.84 91	12.92 54	17.39 9	18.20 56	**6.925 00**	9.753 07	11.58 57	16.98 93	19.22 69	20.33 58	13.63 35	13.69 64	**23.17 38**
Normalized	38.98%	46.02%	51.13%	55.78%	75.08%	78.56%	29.88%	42.09%	49.99%	73.31%	82.97%	87.75%	58.83%	59.1%	100%
Standard Deviation	0%	0.4%	0.5%	0%	0.1%	0.2%	0%	0%	0%	0%	0.2%	0.3%	0.1%	0.2%	0.2%
Quake II RTX - 2560 x 1440 - Off - On - VK_KHR_ray_query (FPS)	52.02 7181	59.31 9477	62.42 2237	68.05 2580	84.08 2197	89.31 6763	61.96 9244	81.70 3108	92.18 7687	125.5 76290	133.6 44108	**141.2 54751**	**13.87 3346**	13.88 4483	14.96 3598
Normalized	36.83%	41.99%	44.19%	48.18%	59.53%	63.23%	43.87%	57.84%	65.26%	88.9%	94.61%	100%	9.82%	9.83%	10.59%
Standard Deviation	0.3%	0.2%	0.8%	0.1%	1.5%	0.7%	0.5%	1.6%	0.7%	1%	2.1%	1.6%	0.2%	0.6%	0%

Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - Off - On - VK_KHR_ray_query (FPS)	23.64	27.26	28.73	31.27	40.12	42.51	28.56	38.57	44.01	61.36	67.38	**70.15**	**13.79**	13.89	14.96
	9643	6305	8416	5315	5613	0989	2389	2145	1223	6859	6162	**2659**	**9673**	4301	3480
Normalized	33.71%	38.87%	40.97%	44.58%	57.2%	60.6%	40.71%	54.98%	62.74%	87.48%	96.06%	100%	19.67%	19.81%	21.33%
Standard Deviation	0.3%	0.6%	0.5%	0.1%	0.2%	0.3%	0.1%	0.2%	0.3%	0.6%	0.3%	0.3%	0.3%	0.3%	0%
Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_query (FPS)	58.47	67.79	71.65	77.92	95.91	100.9	71.83	94.52	106.5	142.1	153.2	**158.6**	**9.659**	9.682	13.37
	1264	4861	7806	5595	8776	87341	7265	2055	99169	51126	33496	**10147**	**133**	401	1763
Normalized	36.86%	42.74%	45.18%	49.13%	60.47%	63.67%	45.29%	59.59%	67.21%	89.62%	96.61%	100%	6.09%	6.1%	8.43%
Standard Deviation	0.2%	0.1%	0.1%	0.2%	1%	0.6%	0.1%	0.3%	0.5%	0.9%	1.2%	2%	0.2%	0.2%	0.9%
Quake II RTX - 2560 x 1440 - High - On - VK_KHR_ray_query (FPS/Watt)	0.287	0.287	0.302	0.306	0.408	0.395	0.386	0.488	0.543	0.518	0.521	**0.557**	**0.079**		0.083
Normalized	51.53%	51.53%	54.22%	54.94%	73.25%	70.92%	69.3%	87.61%	97.49%	93%	93.54%	100%	14.18%		14.9%
Quake II RTX - 1920 x 1080 - Off - Off - VK_KHR_ray_query (FPS)	143.8	159.4	166.3	176.9	211.4	217.6	164.4	206.6	219.2	280.5	292.6	**293.0**	**14.96**	14.96	22.69
	53760	00311	18561	64529	37811	41508	29541	46188	35834	33435	17194	**36647**	**2652**	3125	8851
Normalized	49.09%	54.4%	56.76%	60.39%	72.15%	74.27%	56.11%	70.52%	74.82%	95.73%	99.86%	100%	5.11%	5.11%	7.75%
Standard Deviation	0.8%	0.2%	0.5%	1.8%	1.4%	2.4%	0.5%	0.5%	2.5%	0.8%	2.4%	3.4%	0%	0%	1.4%
Quake II RTX - 1920 x 1080 - Off - On - VK_KHR_ray_query (FPS/Watt)	1.006	0.981	1.087	1.072	1.264	1.265	1.365	1.662	**1.831**	1.615	1.485	1.518	**0.141**		**0.141**
Normalized	54.94%	53.58%	59.37%	58.55%	69.03%	69.09%	74.55%	90.77%	100%	88.2%	81.1%	82.91%	7.7%		7.7%
Quake II RTX - 2560 x 1440 - Off - On - VK_KHR_ray_query (FPS/Watt)	0.484	0.493	0.507	0.519	0.66	0.666	0.648	0.814	**0.897**	0.863	0.814	0.882	0.14		**0.128**
Normalized	53.96%	54.96%	56.52%	57.86%	73.58%	74.25%	72.24%	90.75%	100%	96.21%	90.75%	98.33%	15.61%		14.27%

Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - Off - On - VK_KHR_ray_query (FPS/Watt)	0.181	0.186	0.19	0.192	0.244	0.242	0.235	0.3	0.325	0.331	0.326	**0.351**	0.141		**0.138**
Normalized	51.57%	52.99%	54.13%	54.7%	69.52%	68.95%	66.95%	85.47%	92.59%	94.3%	92.88%	100%	40.17%		39.32%
Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_query (FPS/Watt)	0.572	0.577	0.604	0.628	0.777	0.757	0.778	0.978	**1.077**	0.987	0.943	1.017	**0.08**		0.083
Normalized	53.11%	53.57%	56.08%	58.31%	72.14%	70.29%	72.24%	90.81%	100%	91.64%	87.56%	94.43%	7.43%		7.71%
Quake II RTX - 1920 x 1080 - Off - Off - VK_KHR_ray_query (FPS/Watt)	1.984	2.005	1.952	2.231	2.394	2.28	2.601	2.96	**3.165**	2.468	2.255	2.243	**0.242**		0.277
Normalized	62.69%	63.35%	61.67%	70.49%	75.64%	72.04%	82.18%	93.52%	100%	77.98%	71.25%	70.87%	7.65%		8.75%
Quake II RTX - 2560 x 1440 - High - On - VK_KHR_ray_query (FPS)	34.370907	40.143479	42.654020	46.761717	58.699782	61.598605	42.296956	56.590520	64.402001	87.952543	96.469954	**100.522621**	**9.648233**	9.662646	13.347464
Normalized	34.19%	39.93%	42.43%	46.52%	58.39%	61.28%	42.08%	56.3%	64.07%	87.5%	95.97%	100%	9.6%	9.61%	13.28%
Standard Deviation	0.3%	0.2%	0.5%	0.3%	0.3%	0.6%	0.1%	0.3%	0.5%	0.6%	0.5%	0.3%	0.1%	0.3%	1.3%
Quake II RTX - 2560 x 1440 - Off - Off - VK_KHR_ray_query (FPS)	91.320463	102.597609	107.295315	116.467440	140.622353	146.028314	103.554926	132.367249	145.398889	193.988482	205.956836	**215.382923**	**14.963243**	**14.963243**	22.907520
Normalized	42.4%	47.63%	49.82%	54.07%	65.29%	67.8%	48.08%	61.46%	67.51%	90.07%	95.62%	100%	6.95%	6.95%	10.64%
Standard Deviation	0.2%	0.1%	1.3%	0.7%	1.3%	1.8%	0.9%	1.1%	0.8%	0.3%	2.1%	1.2%	0%	0%	1%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_query (FPS)	15.492279	18.233424	19.314691	21.259767	27.083439	28.628763	19.193729	25.882973	29.746503	41.783488	46.206045	**48.066120**	**9.675606**	9.683956	13.346842
Normalized	32.23%	37.93%	40.18%	44.23%	56.35%	59.56%	39.93%	53.85%	61.89%	86.93%	96.13%	100%	20.13%	20.15%	27.77%
Standard Deviation	0.5%	0.3%	0.8%	0.3%	0.4%	0.9%	0.1%	0.2%	0.5%	0.1%	0.4%	0.5%	0.2%	0.1%	1%

Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - Off - Off - VK_KHR_ray_query (FPS)	43.93	50.23	53.14	58.13	71.45	74.80	50.13	65.54	72.13	99.38	109.1	112.3	14.96	14.96	22.80
	5449	6527	5887	1780	2606	2296	5254	7269	9528	7409	25221	43012	2889	3361	6700
Normalized	39.11%	44.72%	47.31%	51.74%	63.6%	66.58%	44.63%	58.35%	64.21%	88.47%	97.14%	100%	13.32%	13.32%	20.3%
Standard Deviation	0.2%	0.3%	0.2%	0.2%	0.6%	1.4%	0.2%	0.2%	0.7%	1.3%	1%	1.1%	0%	0%	1%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_query (FPS)	83.08	96.48	102.7	110.8	132.6	140.8	102.5	133.4	148.1	192.5	207.3	214.0	10.11	10.12	14.95
	8413	4169	18657	33590	71032	80303	05730	90349	92837	86243	20069	75232	3177	4172	9580
Normalized	38.81%	45.07%	47.98%	51.77%	61.97%	65.81%	47.88%	62.36%	69.22%	89.96%	96.84%	100%	4.72%	4.73%	6.99%
Standard Deviation	0.9%	0.4%	0.1%	0.3%	1.8%	2.1%	1.3%	0.4%	0.3%	1.1%	1.5%	2.3%	0.3%	0.2%	0%
Quake II RTX - 2560 x 1440 - High - Off - VK_KHR_ray_query (FPS)	50.68	58.83	62.97	68.80	85.23	89.31	62.24	81.88	91.42	124.1	134.2	139.4	10.12	10.08	14.96
	6858	4300	8307	6965	8852	8651	1659	4441	6849	53650	36614	13574	9584	1055	3480
Normalized	36.36%	42.2%	45.17%	49.35%	61.14%	64.07%	44.65%	58.73%	65.58%	89.05%	96.29%	100%	7.27%	7.23%	10.73%
Standard Deviation	0.1%	0.6%	0.1%	0.5%	0.2%	0.5%	0.4%	0.2%	1%	0.5%	1%	1.4%	0.5%	0.1%	0%
Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_query (FPS)	23.48	27.68	29.62	32.61	40.95	43.05	28.89	38.48	43.86	60.85	66.73	68.98	10.10	10.12	14.96
	9962	0743	1539	1328	1062	2528	8605	0782	5326	2231	1476	4600	2337	0576	3480
Normalized	34.05%	40.13%	42.94%	47.27%	59.36%	62.41%	41.89%	55.78%	63.59%	88.21%	96.73%	100%	14.64%	14.67%	21.69%
Standard Deviation	0.5%	0.2%	0.4%	0.8%	0.2%	0.4%	0.2%	0.4%	0.3%	1.2%	0.6%	1.1%	0.2%	0.2%	0%
Quake II RTX - 1920 x 1080 - Off - On - VK_KHR_ray_tracing_pipeline (FPS)	83.76	94.61	98.02	105.4	129.4	136.2	101.9	130.5	145.7	188.1	205.9	211.4	14.80	14.80	14.96
	6470	4107	4613	24234	22993	94567	38774	81368	79598	42658	82355	85239	7470	3477	2889
Normalized	39.61%	44.74%	46.35%	49.85%	61.2%	64.45%	48.2%	61.74%	68.93%	88.96%	97.4%	100%	7%	7%	7.08%
Standard Deviation	0.5%	1%	1.1%	0.6%	0.8%	0.5%	0.1%	0.2%	0.4%	1.6%	0.4%	0.8%	0.4%	0.3%	0%

Vulkan Ray-Tracing GPUs

Quake II RTX - 2560 x 1440 - Off - On - VK_KHR_ray_tracing_pipeline (FPS)	50.61 3716	57.46 3234	59.91 0967	64.77 0272	79.65 2306	84.27 6718	60.92 5003	80.05 3465	89.97 2574	120.7 07793	131.5 00221	**136.6 99516**	**14.76 1089**	14.76 8507	14.96 3125
Normalized	37.03%	42.04%	43.83%	47.38%	58.27%	61.65%	44.57%	58.56%	65.82%	88.3%	96.2%	100%	10.8%	10.8%	10.95%
Standard Deviation	0.2%	0.3%	0.7%	0.6%	1%	1%	0.1%	0.2%	0.1%	1.1%	0.3%	0.3%	0.2%	0.3%	0%
Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_tracing_pipeline (FPS)	58.25 7318	68.04 7663	71.05 6552	77.55 5951	95.00 6777	99.00 1911	70.64 1599	91.44 5774	103.9 95079	138.2 26052	151.4 85043	**155.1 31660**	**9.919 260**	9.926 067	14.00 0509
Normalized	37.55%	43.86%	45.8%	49.99%	61.24%	63.82%	45.54%	58.95%	67.04%	89.1%	97.65%	100%	6.39%	6.4%	9.02%
Standard Deviation	0.3%	0.4%	1.7%	0.6%	0.9%	0.9%	0.7%	1%	0.6%	1.9%	0.5%	1.5%	0.1%	0.1%	0.3%
Quake II RTX - 1920 x 1080 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS)	138.1 64120	152.1 80725	156.3 35354	165.6 20865	194.6 10587	207.2 38718	158.5 81047	198.7 22488	214.2 19482	269.7 65314	282.1 78146	**291.0 84515**	14.96 7268	**14.96 3361**	25.53 1778
Normalized	47.47%	52.28%	53.71%	56.9%	66.86%	71.2%	54.48%	68.27%	73.59%	92.68%	96.94%	100%	5.14%	5.14%	8.77%
Standard Deviation	0.8%	0.6%	1%	2.2%	2.5%	1.3%	0.8%	1.1%	1%	1.7%	2.3%	1.2%	0%	0%	0.5%
Quake II RTX - 2560 x 1440 - High - On - VK_KHR_ray_tracing_pipeline (FPS)	34.42 6141	40.71 3183	42.64 9818	46.62 9253	57.48 1467	60.29 8293	41.58 3871	55.27 5561	63.27 5231	85.54 6005	92.93 4103	**96.36 5006**	**9.917 385**	9.933 002	14.04 9056
Normalized	35.72%	42.25%	44.26%	48.39%	59.65%	62.57%	43.15%	57.36%	65.66%	88.77%	96.44%	100%	10.29%	10.31%	14.58%
Standard Deviation	0.4%	0%	0.3%	0.3%	0.5%	1.2%	0.7%	0.8%	0.2%	1%	1%	1.4%	0.1%	0.1%	0.3%
Quake II RTX - 2560 x 1440 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS)	88.14 5306	96.94 5038	100.9 38917	108.6 66702	129.7 02026	137.2 04605	101.0 93756	126.8 73652	138.1 84647	179.9 42525	197.0 69757	**200.7 58548**	**14.96 3125**	14.96 3243	25.58 9859
Normalized	43.91%	48.29%	50.28%	54.13%	64.61%	68.34%	50.36%	63.2%	68.83%	89.63%	98.16%	100%	7.45%	7.45%	12.75%
Standard Deviation	0.5%	1.2%	1.2%	0.1%	1.6%	0.3%	0.2%	1.5%	1.1%	2.4%	0.6%	2.1%	0%	0%	0.3%

Vulkan Ray-Tracing GPUs

Quake II RTX - 2560 x 1440 - Off - Off - VK_KHR_ray_query (FPS/Watt)	1.04	1.053	1.085	1.254	1.323	1.285	1.348	1.572	**1.691**	1.498	1.417	1.536	**0.235**	0.276
Normalized	61.5%	62.27%	64.16%	74.16%	78.24%	75.99%	79.72%	92.96%	100%	88.59%	83.8%	90.83%	13.9%	16.32%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_tracing_pipeline (FPS)	15.55 4536	18.58 2075	19.45 6426	21.34 4598	26.80 5210	28.19 7027	18.95 4288	25.43 7144	29.27 1754	40.43 5432	44.53 3054	**46.10 9526**	9.920 944	**9.919 157**	14.03 2917
Normalized	33.73%	40.3%	42.2%	46.29%	58.13%	61.15%	41.11%	55.17%	63.48%	87.69%	96.58%	100%	21.52%	21.51%	30.43%
Standard Deviation	0.4%	0.3%	0.8%	0.5%	0.3%	0.2%	0.1%	0.2%	0.2%	0.4%	0.7%	1%	0.2%	0.1%	1.1%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_query (FPS/Watt)	0.11	0.109	0.114	0.115	0.148	0.144	0.144	0.18	0.195	0.197	0.201	**0.217**	**0.079**	0.083
Normalized	50.69%	50.23%	52.53%	53%	68.2%	66.36%	66.36%	82.95%	89.86%	90.78%	92.63%	100%	36.41%	38.25%
Quake II RTX - 3840 x 2160 - Off - Off - VK_KHR_ray_query (FPS/Watt)	0.399	0.399	0.417	0.432	0.533	0.51	0.493	0.607	0.64	0.623	0.626	**0.658**	**0.239**	0.271
Normalized	60.64%	60.64%	63.37%	65.65%	81%	77.51%	74.92%	92.25%	97.26%	94.68%	95.14%	100%	36.32%	41.19%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_query (FPS/Watt)	0.909	0.938	0.969	1.092	1.217	1.178	1.3	1.591	**1.718**	1.494	1.418	1.508	**0.107**	0.12
Normalized	52.91%	54.6%	56.4%	63.56%	70.84%	68.57%	75.67%	92.61%	100%	86.96%	82.54%	87.78%	6.23%	6.98%
Quake II RTX - 3840 x 2160 - Off - On - VK_KHR_ray_tracing_pipeline (FPS)	23.14 4706	26.64 0702	27.73 7285	30.04 6475	38.21 1540	40.49 8202	28.03 1572	37.37 4092	42.42 0367	58.83 8251	64.09 1999	**66.55 4492**	14.79 9886	**14.76 0980**	14.96 3243
Normalized	34.78%	40.03%	41.68%	45.15%	57.41%	60.85%	42.12%	56.16%	63.74%	88.41%	96.3%	100%	22.24%	22.18%	22.48%
Standard Deviation	0.2%	0.3%	0.3%	0.4%	0.5%	0.2%	0%	0.8%	0.6%	0.2%	0.4%	0.3%	0.4%	0.2%	0%

Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS)	42.535695	48.284888	50.238969	54.040936	65.523567	69.580775	48.606337	63.104333	68.648209	94.155581	100.804863	**104.691553**	14.963361	**14.963243**	25.729016
Normalized	40.63%	46.12%	47.99%	51.62%	62.59%	66.46%	46.43%	60.28%	65.57%	89.94%	96.29%	100%	14.29%	14.29%	24.58%
Standard Deviation	0.3%	0.3%	0.2%	0%	0.6%	0.3%	0.7%	0.2%	1.2%	0.4%	1.4%	0.8%	0%	0%	0.5%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_tracing_pipeline (FPS)	83.116453	97.173899	101.058451	109.193565	131.165489	137.253647	101.179228	130.278290	143.027504	184.757216	196.407736	**210.896103**	10.618338	**10.594867**	14.963480
Normalized	39.41%	46.08%	47.92%	51.78%	62.19%	65.08%	47.98%	61.77%	67.82%	87.61%	93.13%	100%	5.03%	5.02%	7.1%
Standard Deviation	0.9%	0.7%	1.3%	1.3%	0.9%	1.8%	0.3%	0.2%	1.9%	2.5%	1.7%	0.2%	0.4%	0.6%	0%
Quake II RTX - 2560 x 1440 - High - Off - VK_KHR_ray_tracing_pipeline (FPS)	50.742679	59.939510	62.777038	68.436269	82.125969	86.586640	61.101595	79.506252	88.806711	118.162163	128.746351	**135.045723**	10.654447	**10.602433**	14.963361
Normalized	37.57%	44.38%	46.49%	50.68%	60.81%	64.12%	45.25%	58.87%	65.76%	87.5%	95.34%	100%	7.89%	7.85%	11.08%
Standard Deviation	0.2%	0.3%	0.6%	0.4%	1.3%	1%	0.6%	1.4%	1.1%	1.5%	2.2%	0.2%	0.5%	0.1%	0%
Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_tracing_pipeline (FPS)	23.602904	28.373232	29.784797	32.553870	39.972260	41.879195	28.462314	37.535384	42.591031	58.378567	63.391673	**66.135676**	**10.596561**	10.638356	14.963243
Normalized	35.69%	42.9%	45.04%	49.22%	60.44%	63.32%	43.04%	56.76%	64.4%	88.27%	95.85%	100%	16.02%	16.09%	22.63%
Standard Deviation	0.4%	0.2%	0.1%	0.2%	0.2%	0.4%	0%	0.7%	0.1%	0.6%	0.1%	0.1%	0.3%	0.3%	0%
Quake II RTX - 2560 x 1440 - High - Off - VK_KHR_ray_query (FPS/Watt)	0.472	0.483	0.505	0.537	0.646	0.64	0.644	0.798	**0.873**	0.825	0.806	0.855	**0.105**		0.124
Normalized	54.07%	55.33%	57.85%	61.51%	74%	73.31%	73.77%	91.41%	100%	94.5%	92.33%	97.94%	12.03%		14.2%

Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_query (FPS/Watt)	0.18	0.183	0.196	0.205	0.247	0.244	0.24	0.297	0.324	0.326	0.329	**0.343**	**0.105**		0.117
Normalized	52.48%	53.35%	57.14%	59.77%	72.01%	71.14%	69.97%	86.59%	94.46%	95.04%	95.92%	100%	30.61%		34.11%
Quake II RTX - 1920 x 1080 - Off - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.94	0.966	1.006	1.061	1.27	1.247	1.341	1.637	**1.821**	1.55	1.488	1.572	0.145		**0.139**
Normalized	51.62%	53.05%	55.24%	58.26%	69.74%	68.48%	73.64%	89.9%	100%	85.12%	81.71%	86.33%	7.96%		7.63%
Quake II RTX - 1920 x 1080 - Off - On - VK_KHR_ray_query (FPS)	86.87	97.98	102.9	109.6	135.8	141.8	103.0	133.3	148.2	194.2	209.5	**212.5**	**13.92**	13.93	14.96
	0106	5710	95705	40621	67142	73757	04801	46260	56954	07498	95960	**28445**	**1177**	2005	3243
Normalized	40.87%	46.1%	48.46%	51.59%	63.93%	66.76%	48.47%	62.74%	69.76%	91.38%	98.62%	100%	6.55%	6.56%	7.04%
Standard Deviation	0.2%	0.8%	2%	1.9%	1.2%	1.8%	1.3%	1.1%	2.1%	1.8%	2.1%	2.5%	0.6%	0.6%	0%
Quake II RTX - 2560 x 1440 - Off - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.481	0.475	0.503	0.519	0.648	0.623	0.658	0.804	**0.902**	0.835	0.818	0.876	0.147		**0.122**
Normalized	53.33%	52.66%	55.76%	57.54%	71.84%	69.07%	72.95%	89.14%	100%	92.57%	90.69%	97.12%	16.3%		13.53%
Quake II RTX - 3840 x 2160 - Off - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.181	0.181	0.183	0.183	0.237	0.227	0.237	0.297	0.325	0.319	0.322	**0.35**	0.143		**0.139**
Normalized	51.71%	51.71%	52.29%	52.29%	67.71%	64.86%	67.71%	84.86%	92.86%	91.14%	92%	100%	40.86%		39.71%

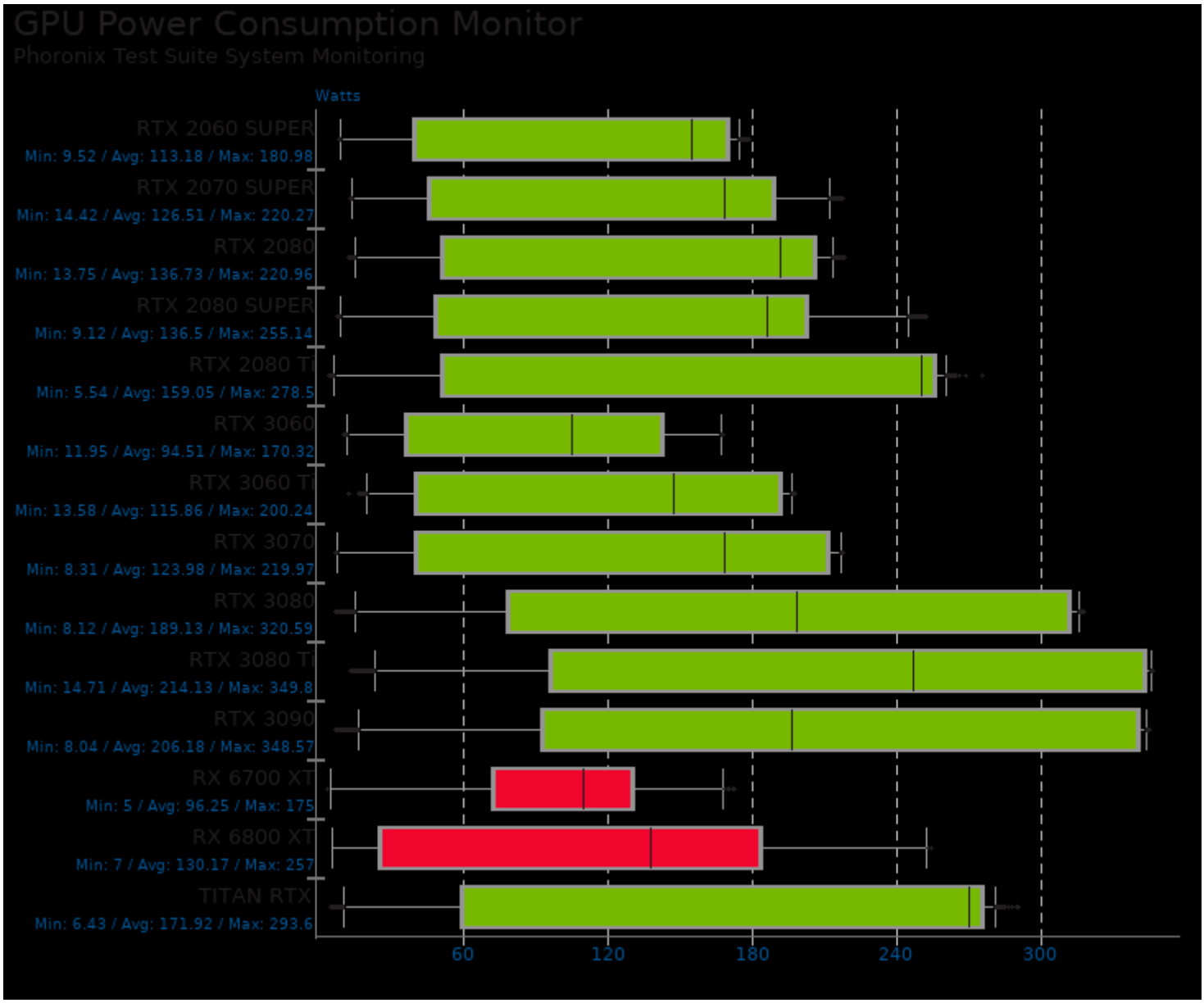
Vulkan Ray-Tracing GPUs

Quake II RTX - 1920 x 1080 - High - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.583	0.612	0.613	0.66	0.771	0.761	0.792	0.972	**1.103**	1.001	0.996	1.045	**0.078**	0.083
Normalized	52.86%	55.49%	55.58%	59.84%	69.9%	68.99%	71.8%	88.12%	100%	90.75%	90.3%	94.74%	7.07%	7.52%
Quake II RTX - 1920 x 1080 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	1.903	1.961	1.856	2.092	2.316	2.132	2.627	2.946	**3.124**	2.44	2.222	2.453	**0.259**	0.294
Normalized	60.92%	62.77%	59.41%	66.97%	74.14%	68.25%	84.09%	94.3%	100%	78.1%	71.13%	78.52%	8.29%	9.41%
Quake II RTX - 2560 x 1440 - High - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.291	0.305	0.31	0.315	0.394	0.386	0.387	0.492	0.537	0.518	0.52	**0.557**	**0.08**	0.083
Normalized	52.24%	54.76%	55.66%	56.55%	70.74%	69.3%	69.48%	88.33%	96.41%	93%	93.36%	100%	14.36%	14.9%
Quake II RTX - 2560 x 1440 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	1.049	1.044	1.008	1.129	1.293	1.237	1.346	1.569	**1.682**	1.405	1.41	1.499	**0.242**	0.294
Normalized	62.37%	62.07%	59.93%	67.12%	76.87%	73.54%	80.02%	93.28%	100%	83.53%	83.83%	89.12%	14.39%	17.48%
Quake II RTX - 3840 x 2160 - High - On - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.113	0.114	0.118	0.117	0.147	0.145	0.145	0.18	0.196	0.194	0.199	**0.212**	**0.079**	0.083
Normalized	53.3%	53.77%	55.66%	55.19%	69.34%	68.4%	68.4%	84.91%	92.45%	91.51%	93.87%	100%	37.26%	39.15%

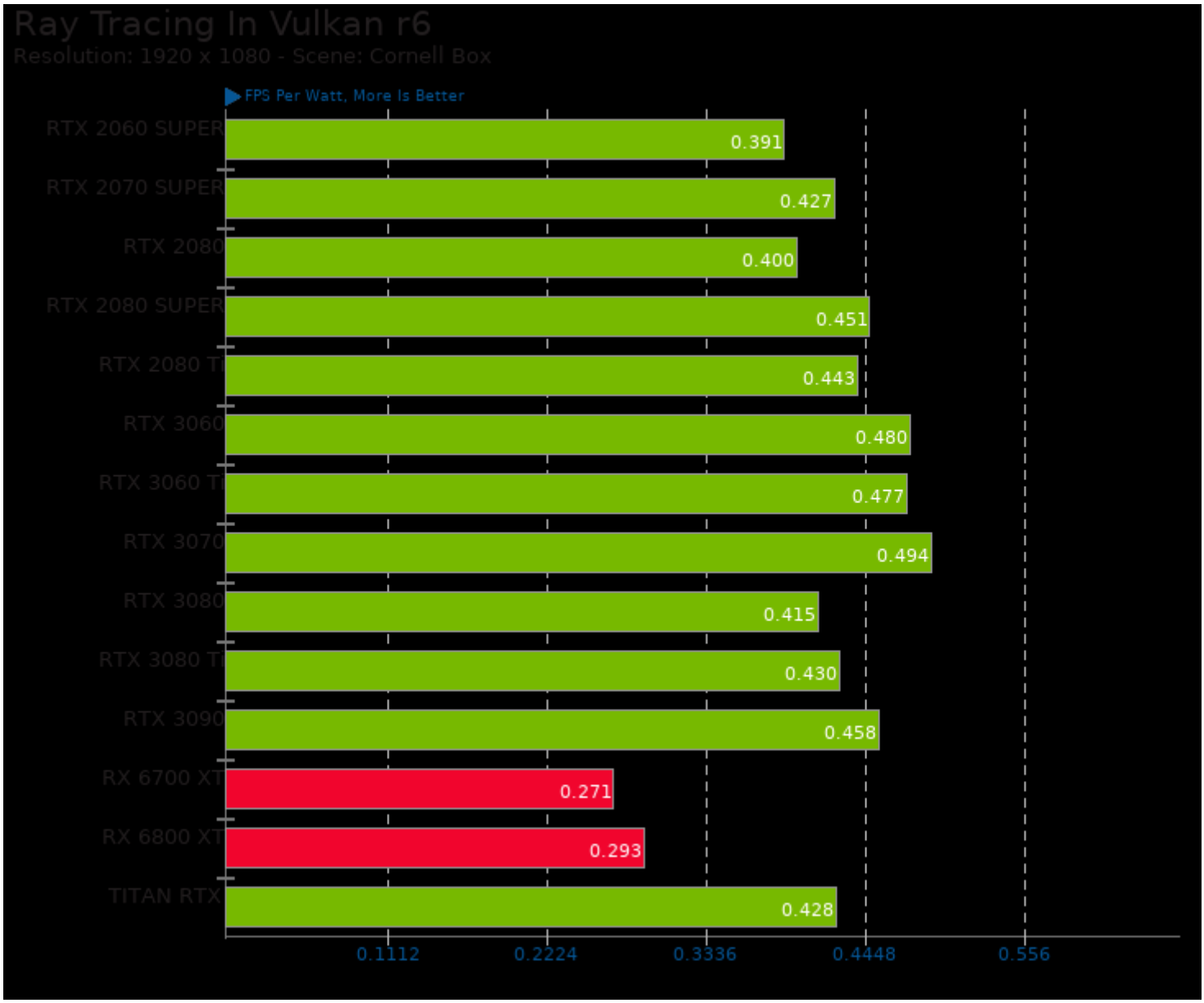
Vulkan Ray-Tracing GPUs

Quake II RTX - 3840 x 2160 - Off - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.39	0.389	0.389	0.42	0.492	0.475	0.493	0.598	**0.635**	0.605	0.592	0.634	**0.234**	0.293
Normalized	61.42%	61.26%	61.26%	66.14%	77.48%	74.8%	77.64%	94.17%	100%	95.28%	93.23%	99.84%	36.85%	46.14%
Quake II RTX - 1920 x 1080 - High - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.96	1.002	0.991	1.1	1.289	1.253	1.321	1.597	**1.756**	1.439	1.413	1.584	**0.109**	0.121
Normalized	54.67%	57.06%	56.44%	62.64%	73.41%	71.36%	75.23%	90.95%	100%	81.95%	80.47%	90.21%	6.21%	6.89%
Quake II RTX - 2560 x 1440 - High - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.481	0.527	0.529	0.566	0.665	0.636	0.659	0.808	**0.882**	0.831	0.804	0.872	**0.11**	0.117
Normalized	54.54%	59.75%	59.98%	64.17%	75.4%	72.11%	74.72%	91.61%	100%	94.22%	91.16%	98.87%	12.47%	13.27%
Quake II RTX - 3840 x 2160 - High - Off - VK_KHR_ray_tracing_pipeline (FPS/Watt)	0.185	0.195	0.2	0.21	0.245	0.238	0.243	0.298	0.322	0.322	0.319	**0.341**	**0.109**	0.115
Normalized	54.25%	57.18%	58.65%	61.58%	71.85%	69.79%	71.26%	87.39%	94.43%	94.43%	93.55%	100%	31.96%	33.72%

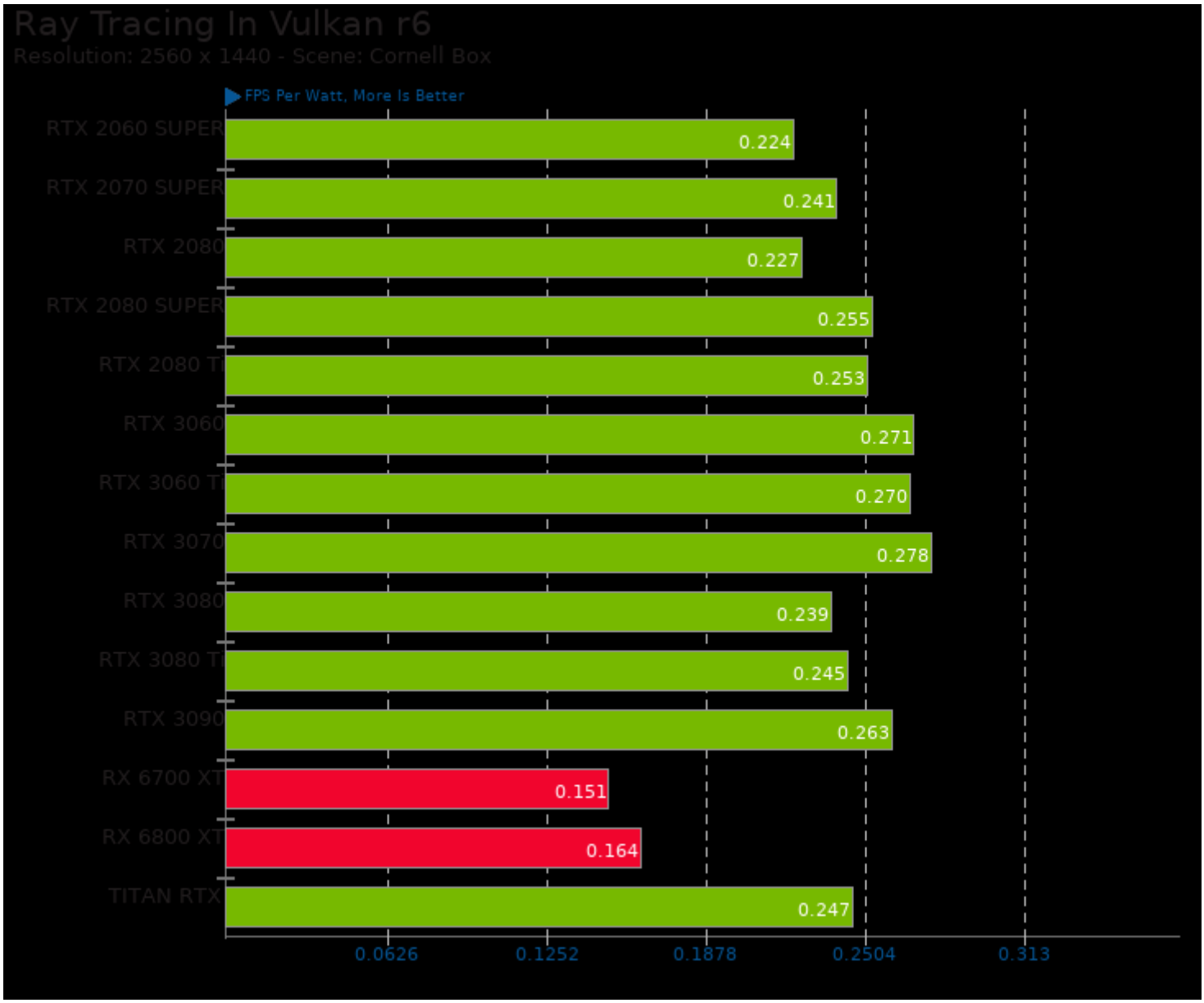
Vulkan Ray-Tracing GPUs



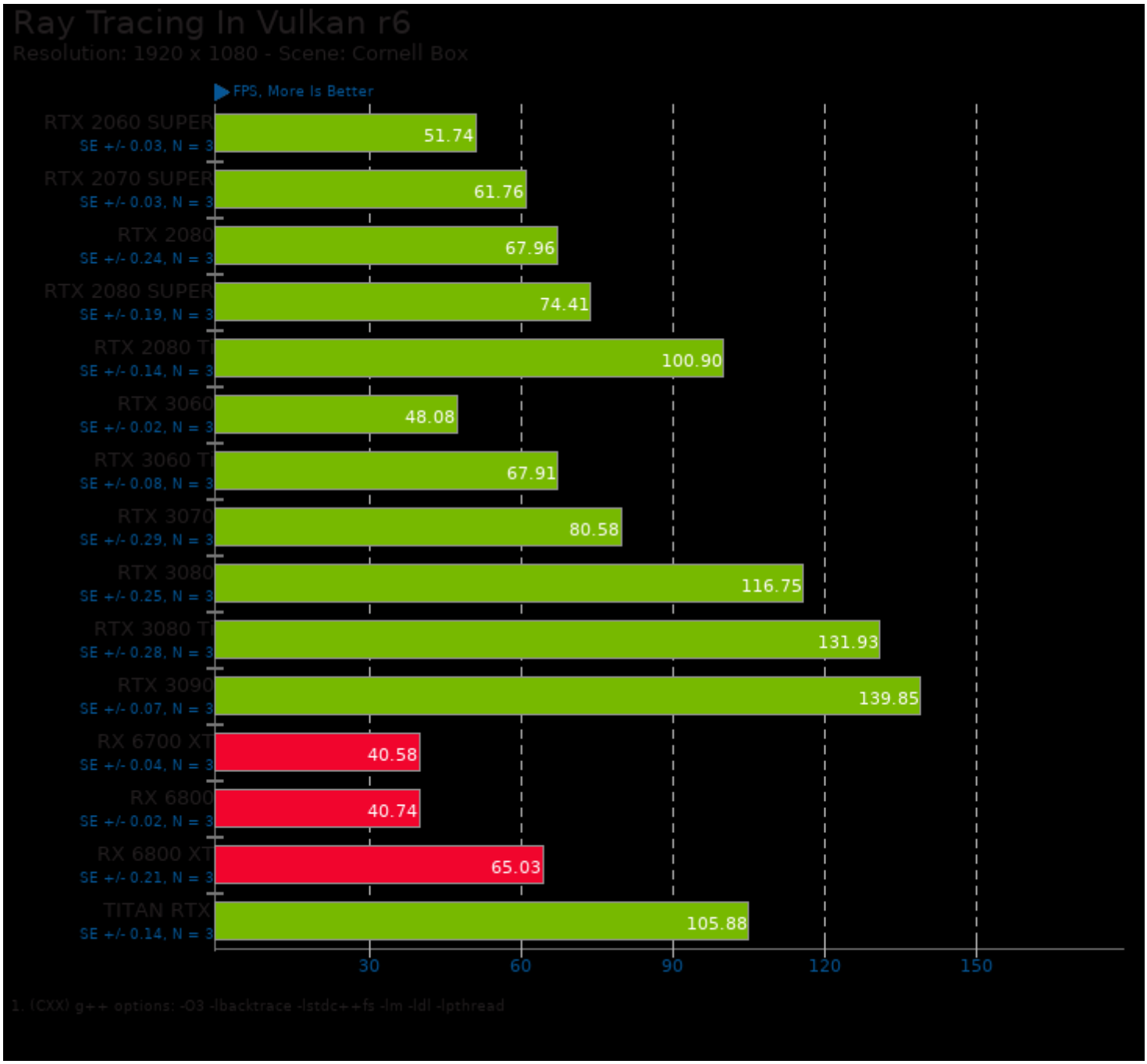
Vulkan Ray-Tracing GPUs



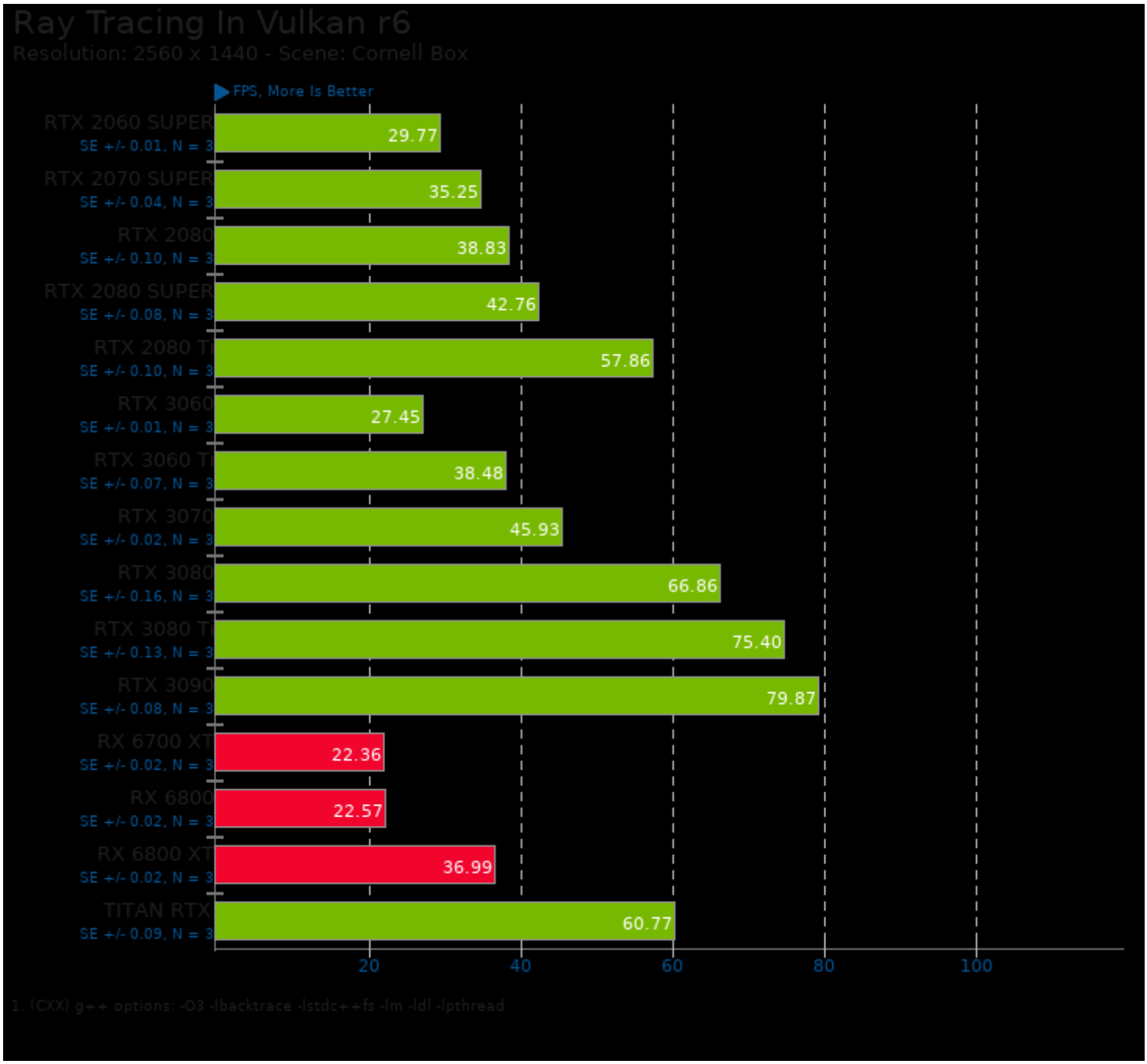
Vulkan Ray-Tracing GPUs



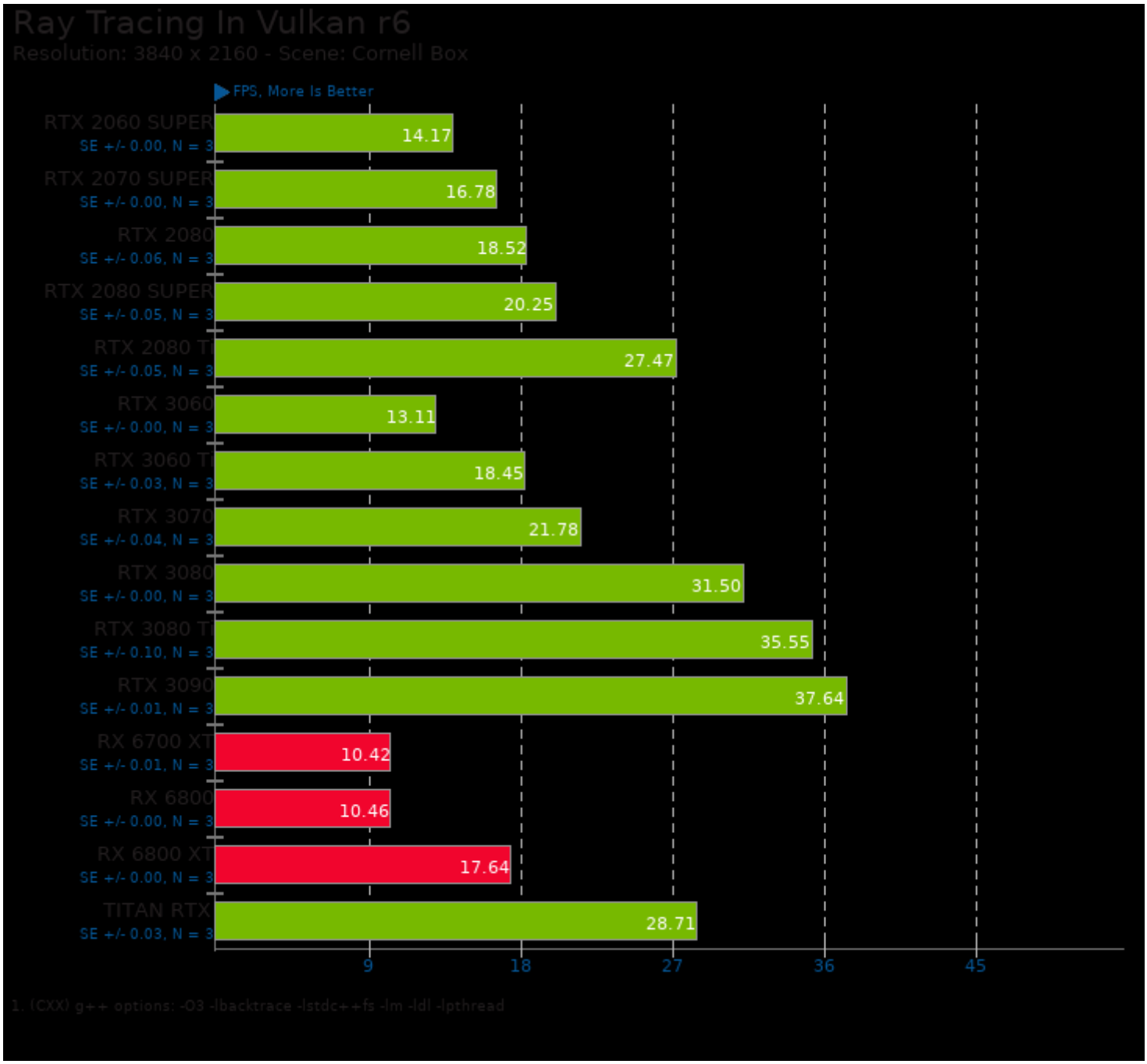
Vulkan Ray-Tracing GPUs



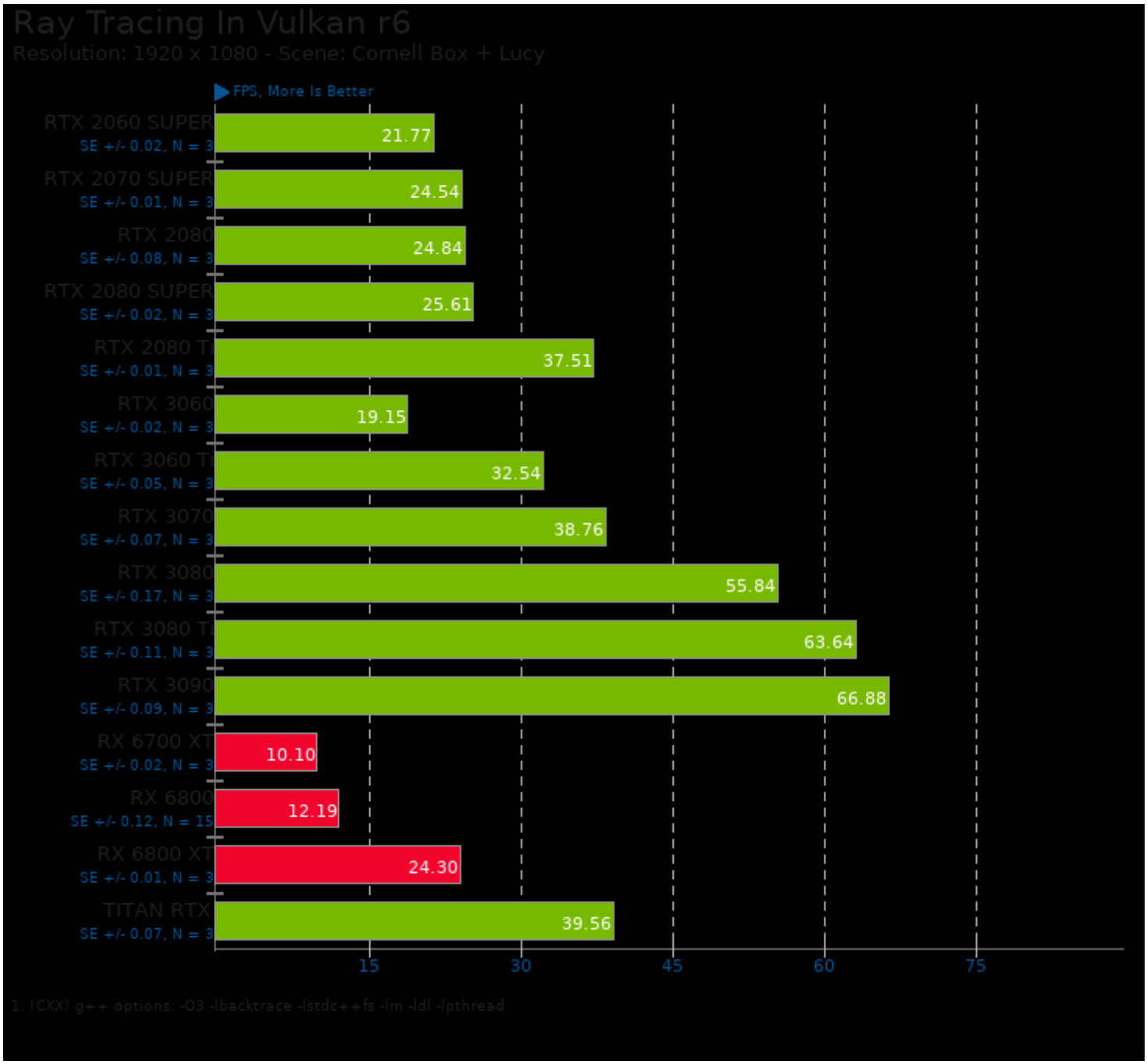
Vulkan Ray-Tracing GPUs



Vulkan Ray-Tracing GPUs



Vulkan Ray-Tracing GPUs

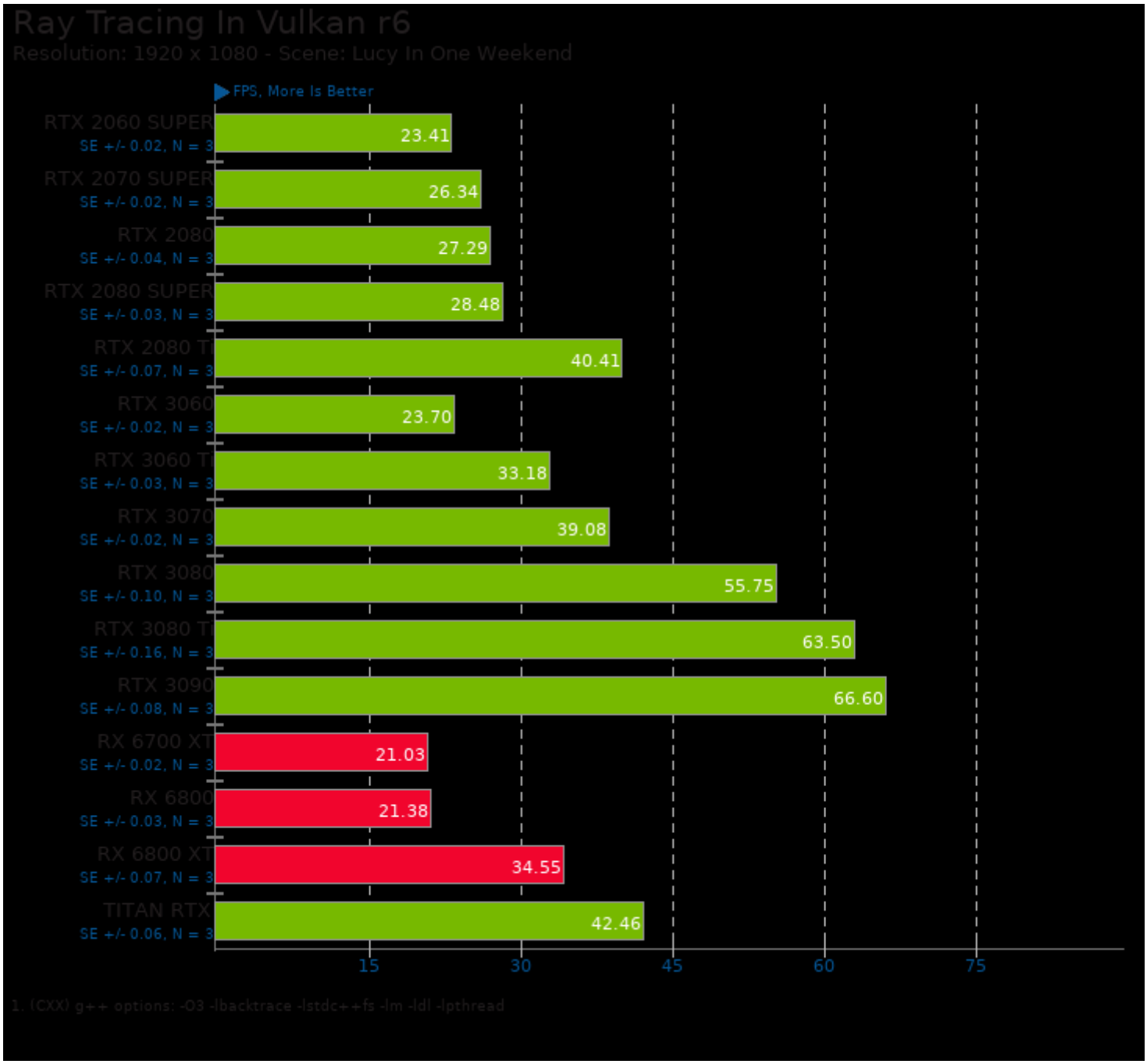


Vulkan Ray-Tracing GPUs

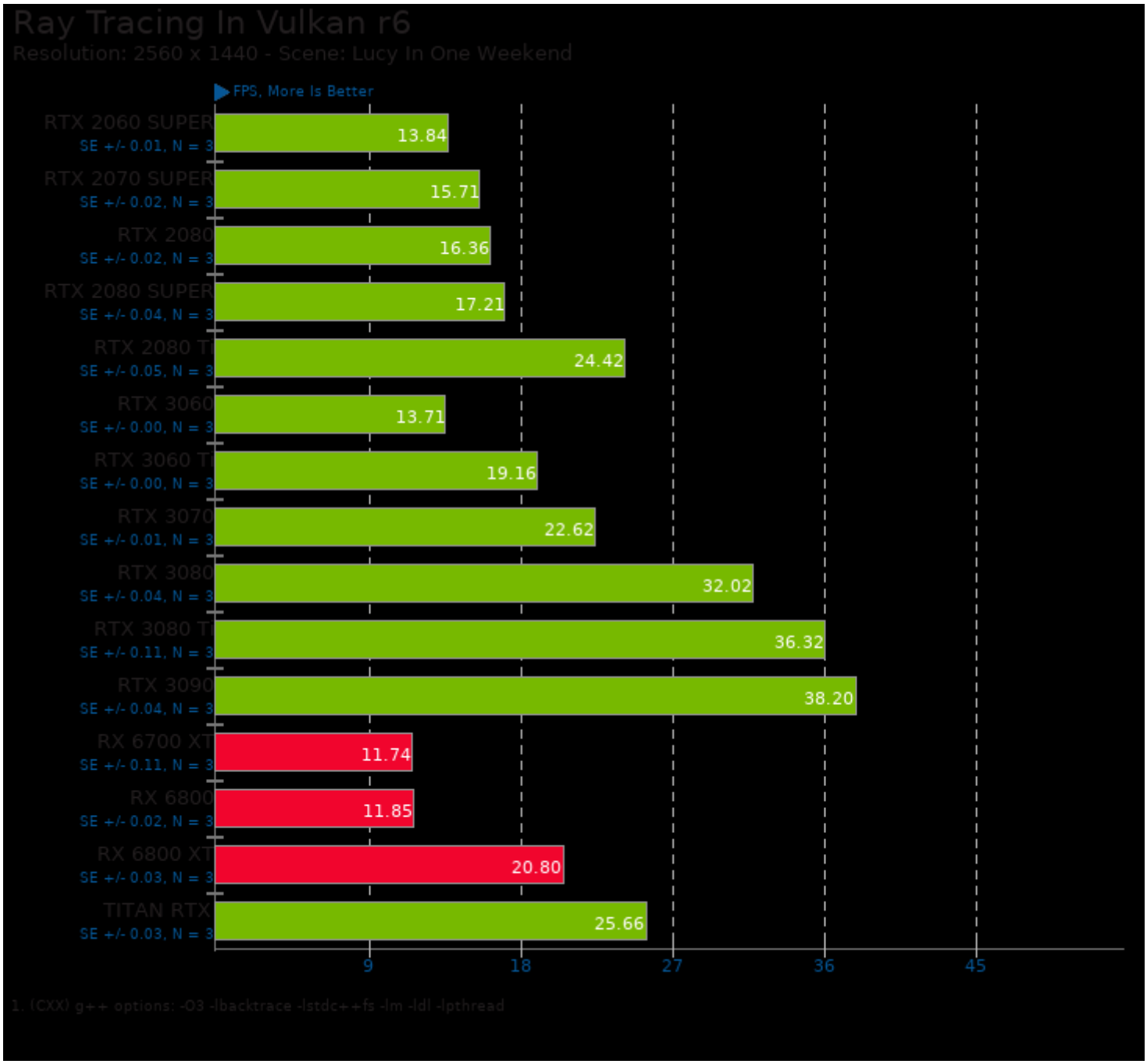



Ray Tracing In Vulkan r6
Resolution: 3840 x 2160 - Scene: Cornell Box + Lucy
FPS, More Is Better
RTX 2060 SUPER
SE +/- 0.00261, N = 3
5.98972
RTX 2070 SUPER
SE +/- 0.00969, N = 3
6.78420
RTX 2080
SE +/- 0.00534, N = 3
6.93396
RTX 2080 SUPER
SE +/- 0.00865, N = 3
7.13569
RTX 2080 Ti
SE +/- 0.00684, N = 3
10.53500
RTX 3060
SE +/- 0.00421, N = 3
5.33619
RTX 3060 Ti
SE +/- 0.00623, N = 3
8.99226
RTX 3070
SE +/- 0.01288, N = 3
10.75140
RTX 3080
SE +/- 0.01502, N = 3
15.65610
RTX 3080 Ti
SE +/- 0.04262, N = 3
17.77380
RTX 3090
SE +/- 0.03766, N = 3
18.73250
RX 6700 XT
SE +/- 0.00645, N = 3
2.73484
RX 6800
SE +/- 0.02586, N = 3
3.36229
RX 6800 XT
SE +/- 0.00417, N = 3
6.49872
TITAN RTX
SE +/- 0.01838, N = 3
11.11780
5
10
15
20
25
1. (CXX) g++ options: -O3 -lbacktrace -lstdc++fs -lm -ldl -lpthread

Vulkan Ray-Tracing GPUs

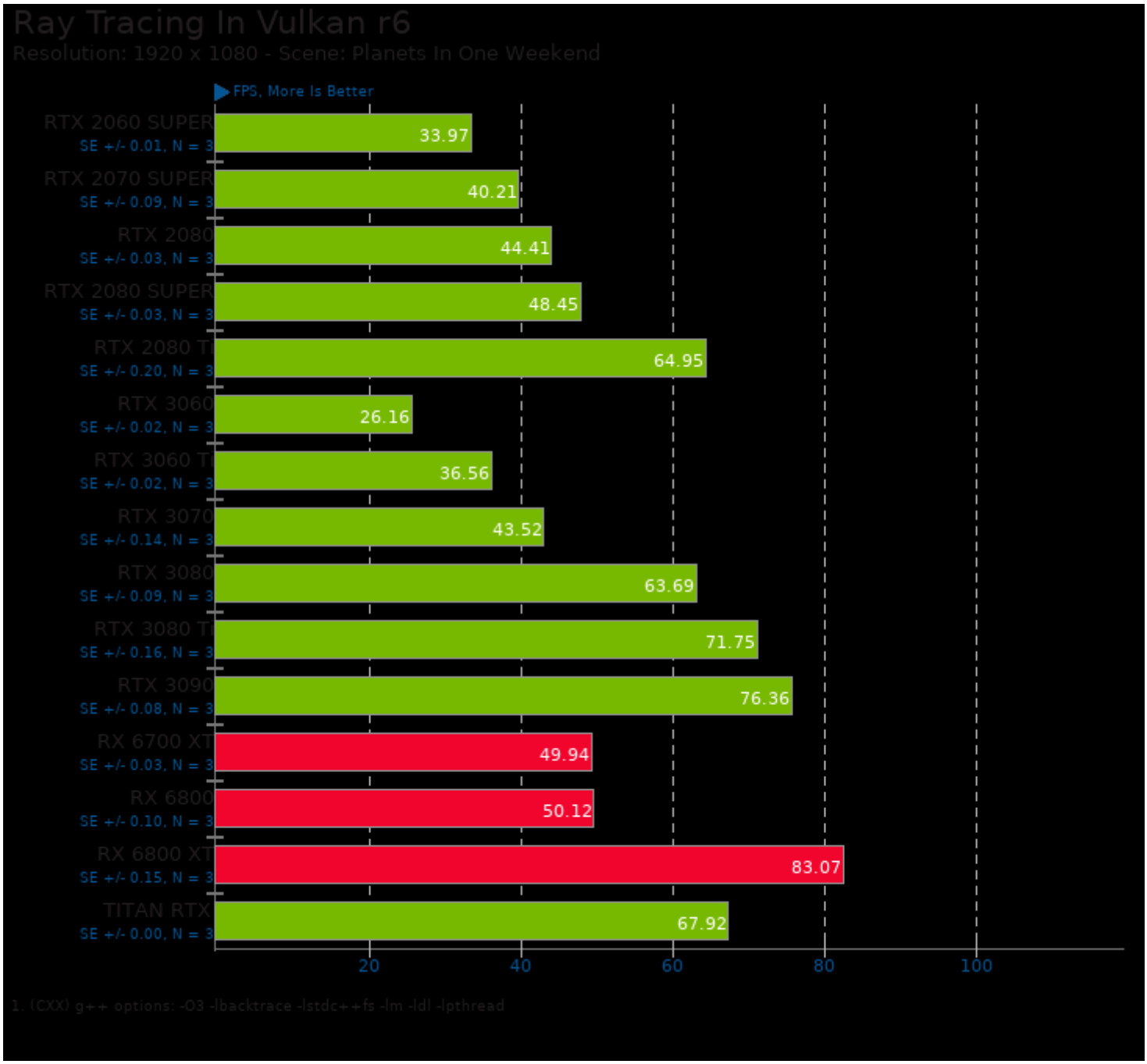


Vulkan Ray-Tracing GPUs

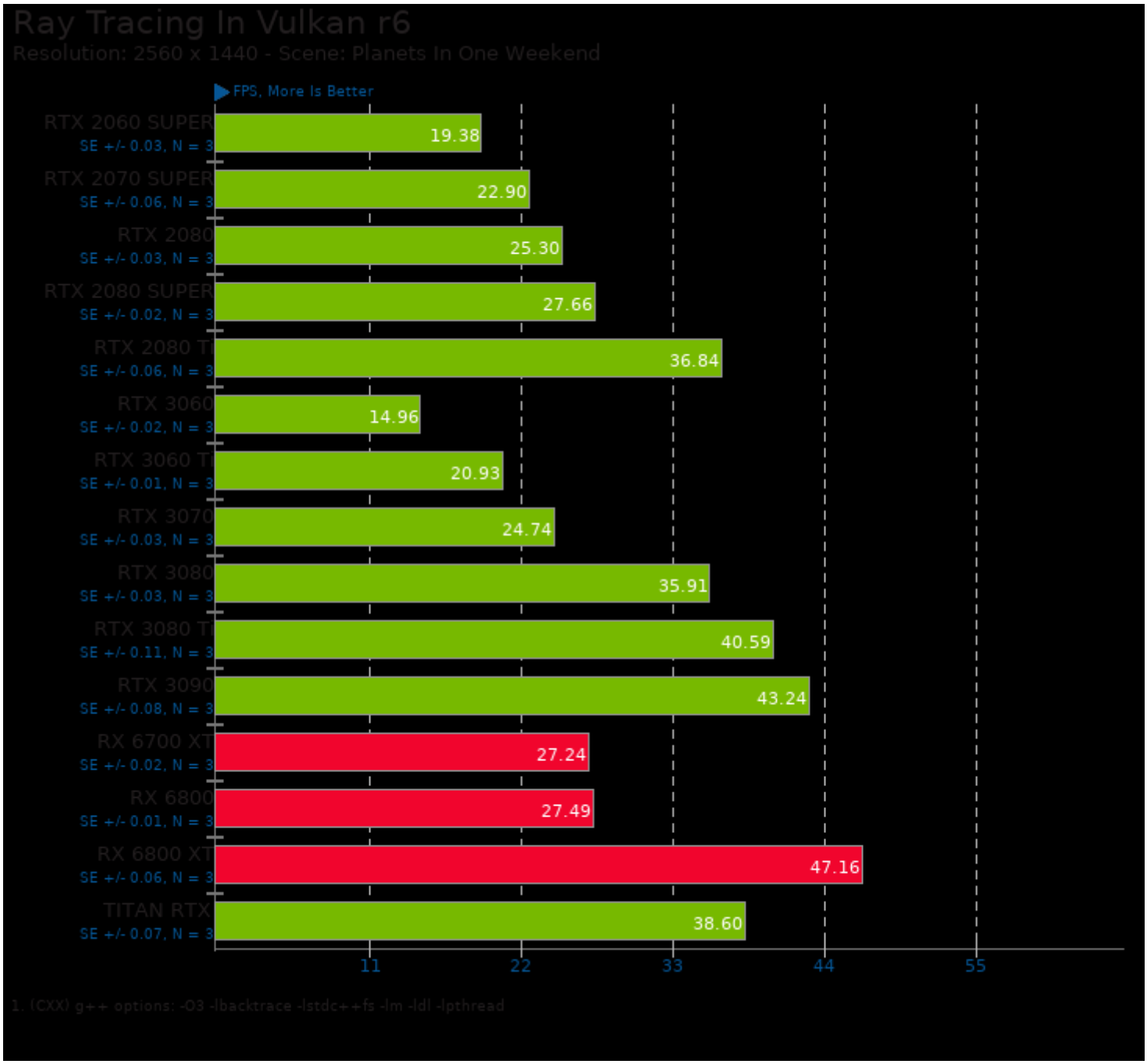


Vulkan Ray-Tracing GPUs




Ray Tracing In Vulkan r6
Resolution: 1920 x 1080 - Scene: Planets In One Weekend
FPS, More Is Better
RTX 2060 SUPER
SE +/- 0.01, N = 3
33.97
RTX 2070 SUPER
SE +/- 0.09, N = 3
40.21
RTX 2080
SE +/- 0.03, N = 3
44.41
RTX 2080 SUPER
SE +/- 0.03, N = 3
48.45
RTX 2080 Ti
SE +/- 0.20, N = 3
64.95
RTX 3060
SE +/- 0.02, N = 3
26.16
RTX 3060 Ti
SE +/- 0.02, N = 3
36.56
RTX 3070
SE +/- 0.14, N = 3
43.52
RTX 3080
SE +/- 0.09, N = 3
63.69
RTX 3080 Ti
SE +/- 0.16, N = 3
71.75
RTX 3090
SE +/- 0.08, N = 3
76.36
RX 6700 XT
SE +/- 0.03, N = 3
49.94
RX 6800
SE +/- 0.10, N = 3
50.12
RX 6800 XT
SE +/- 0.15, N = 3
83.07
TITAN RTX
SE +/- 0.00, N = 3
67.92
20
40
60
80
100
1. (CXX) g++ options: -O3 -lbacktrace -lstdc++fs -lm -ldl -lpthread

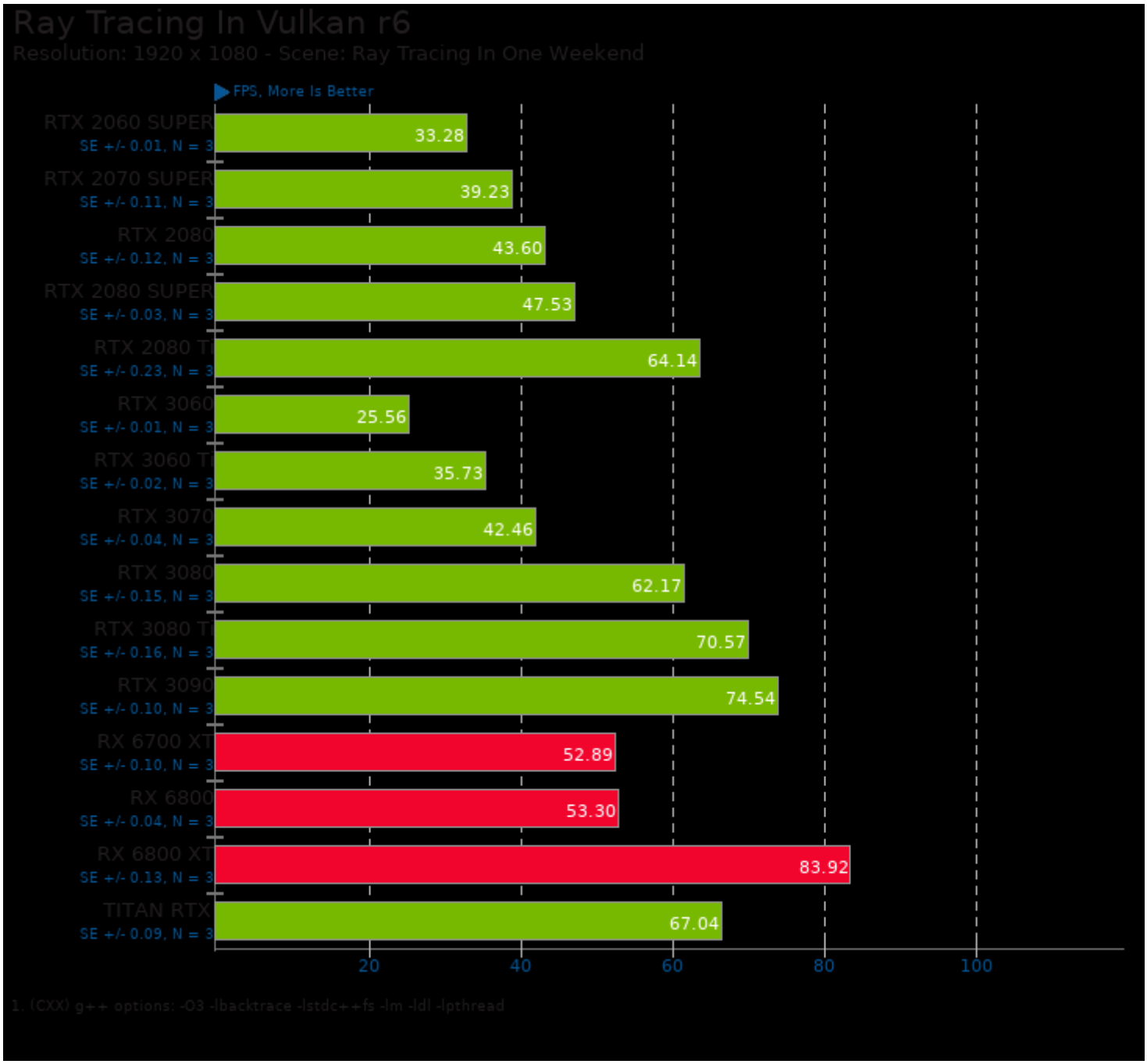
Vulkan Ray-Tracing GPUs



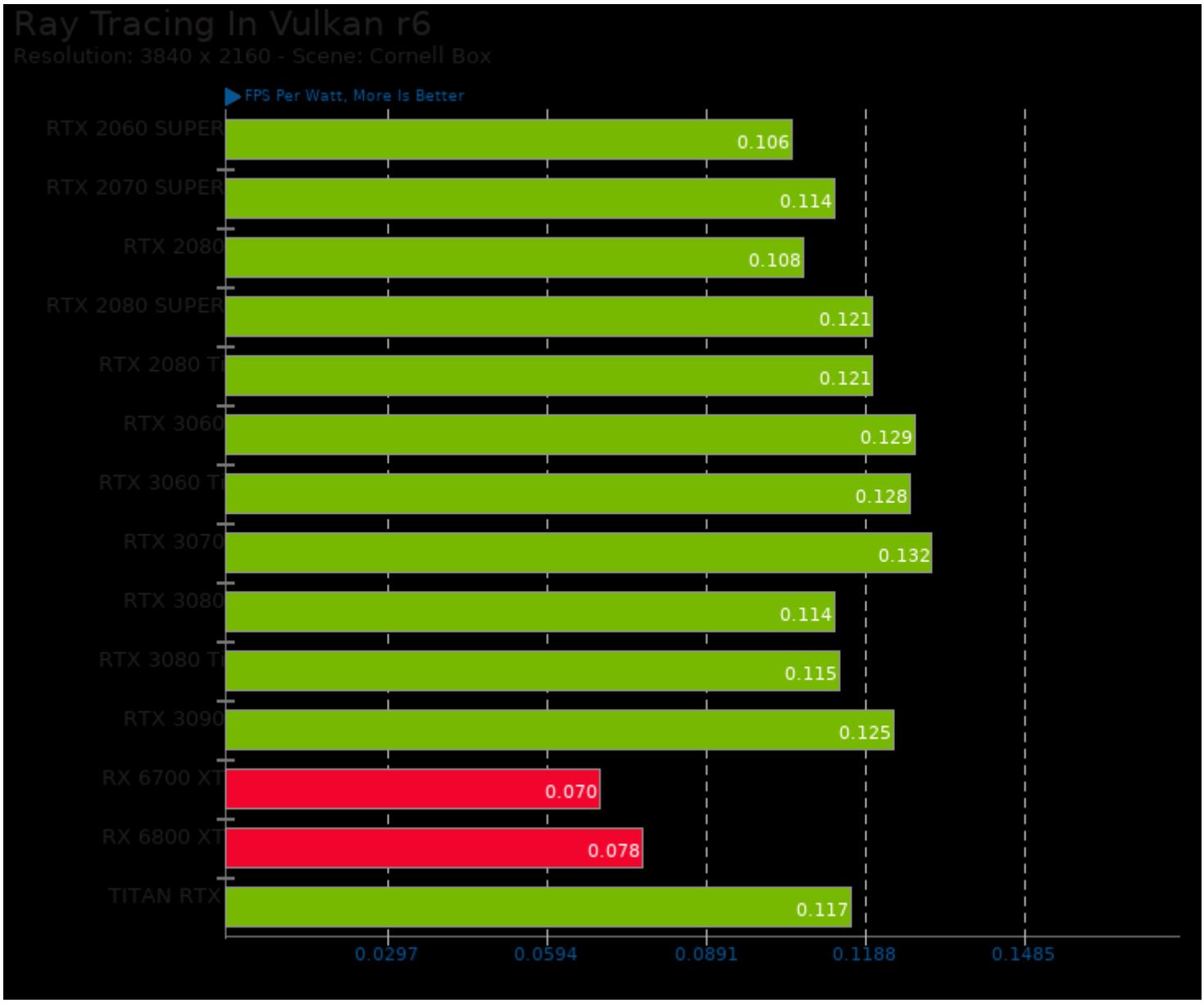
Vulkan Ray-Tracing GPUs

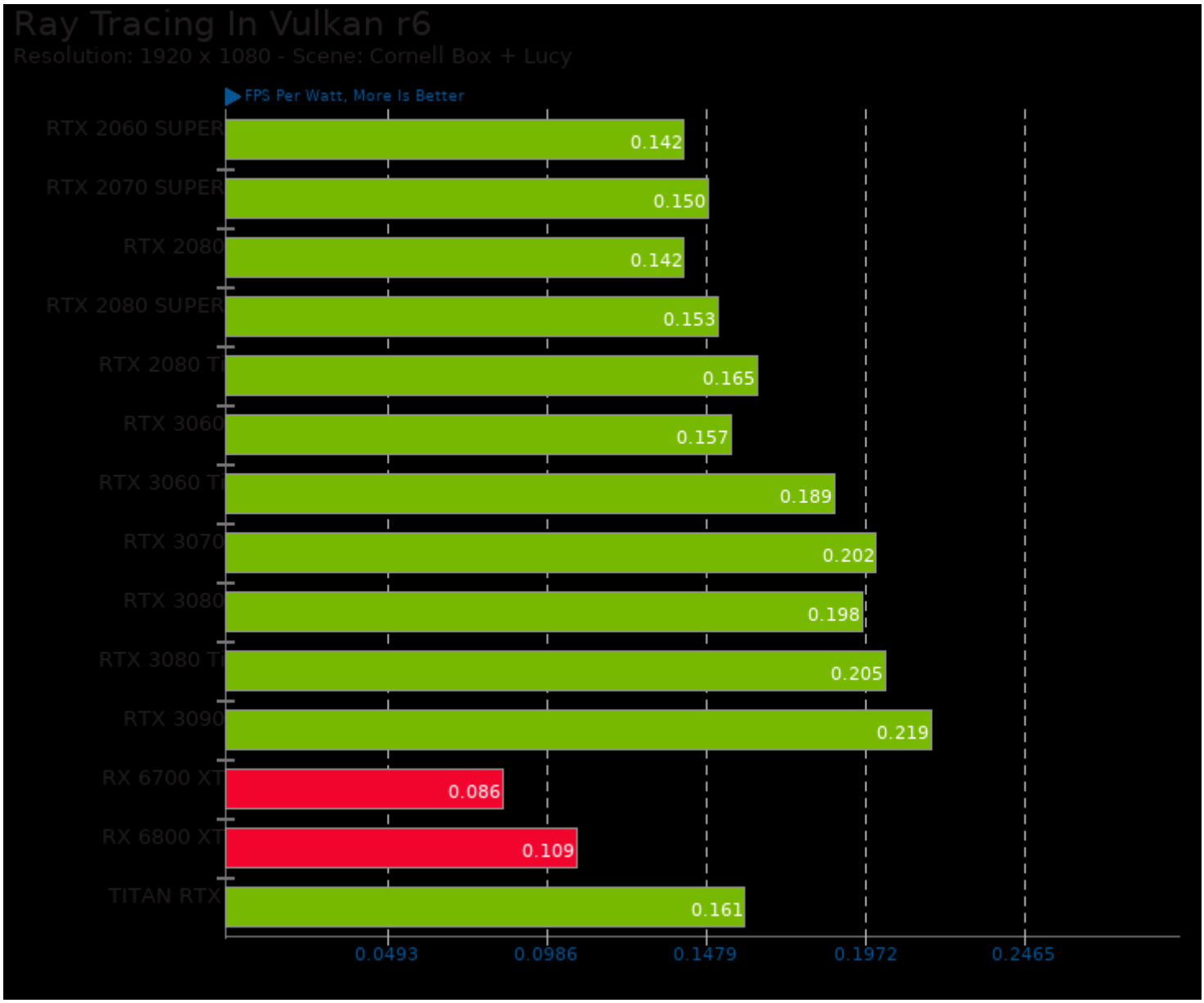


Vulkan Ray-Tracing GPUs

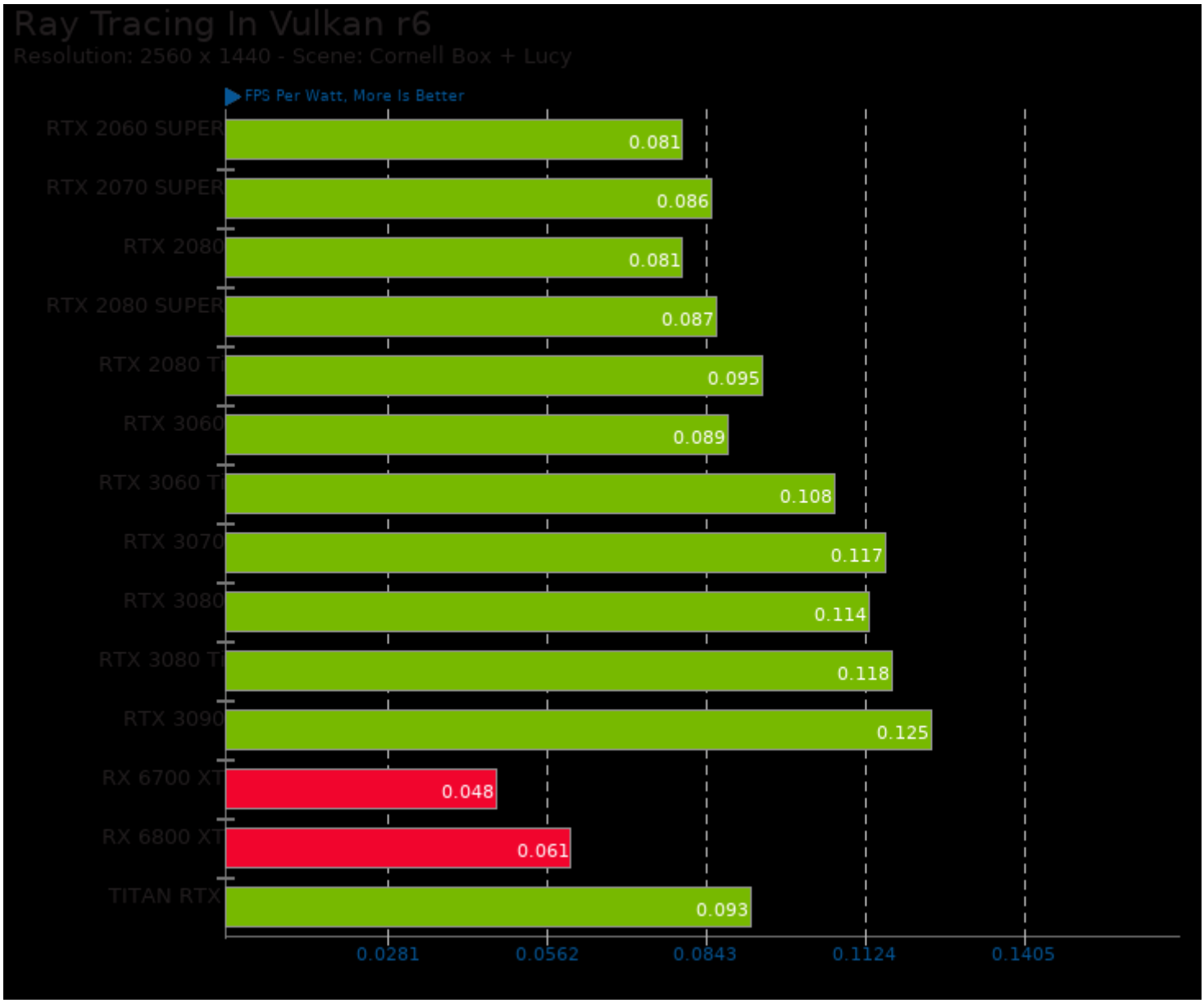


Vulkan Ray-Tracing GPUs

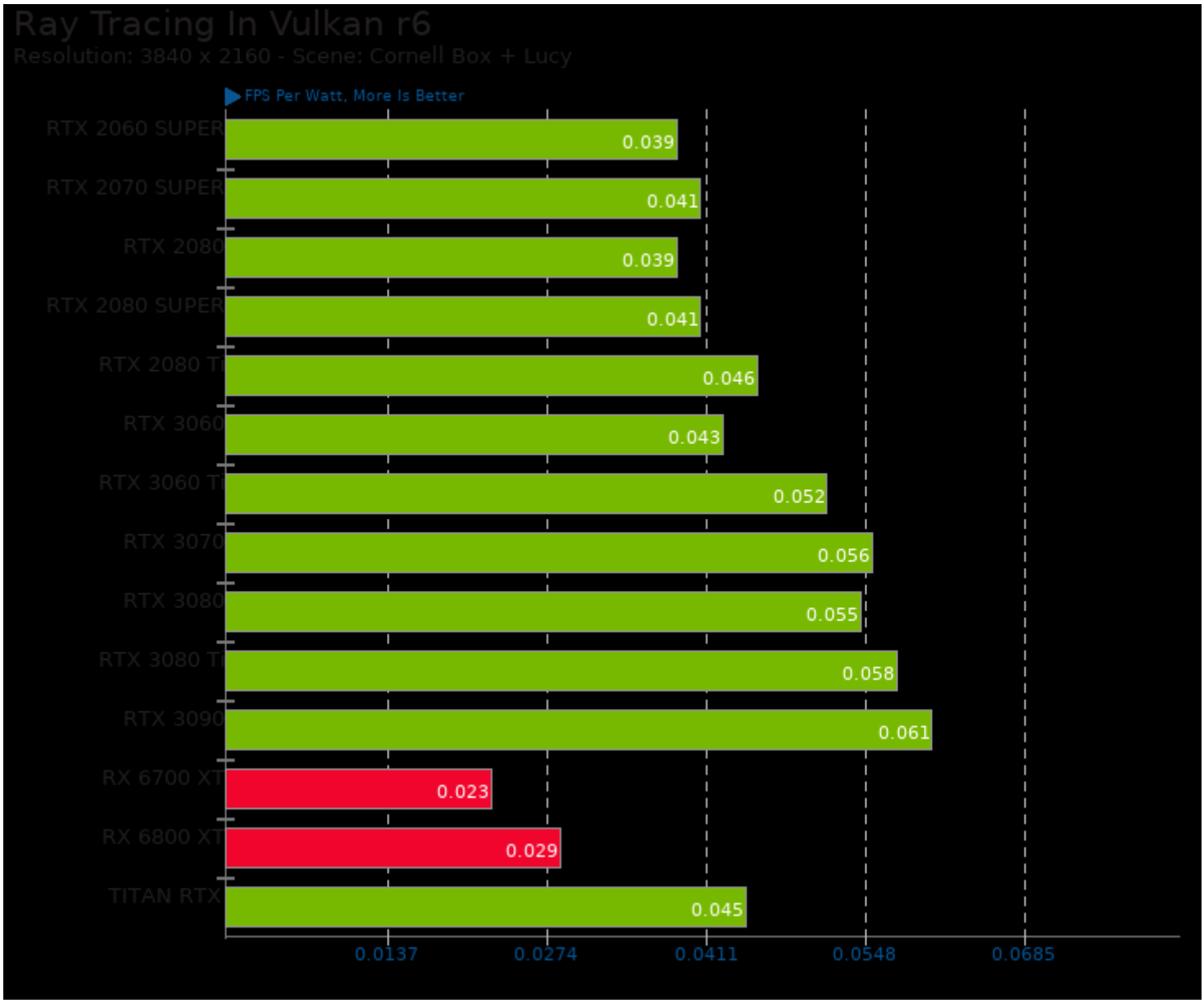



Ray Tracing In Vulkan r6
Resolution: 1920 x 1080 - Scene: Cornell Box + Lucy
FPS Per Watt, More Is Better
RTX 2060 SUPER
0.142
RTX 2070 SUPER
0.150
RTX 2080
0.142
RTX 2080 SUPER
0.153
RTX 2080 Ti
0.165
RTX 3060
0.157
RTX 3060 Ti
0.189
RTX 3070
0.202
RTX 3080
0.198
RTX 3080 Ti
0.205
RTX 3090
0.219
RX 6700 XT
0.086
RX 6800 XT
0.109
TITAN RTX
0.161
0.0493
0.0986
0.1479
0.1972
0.2465

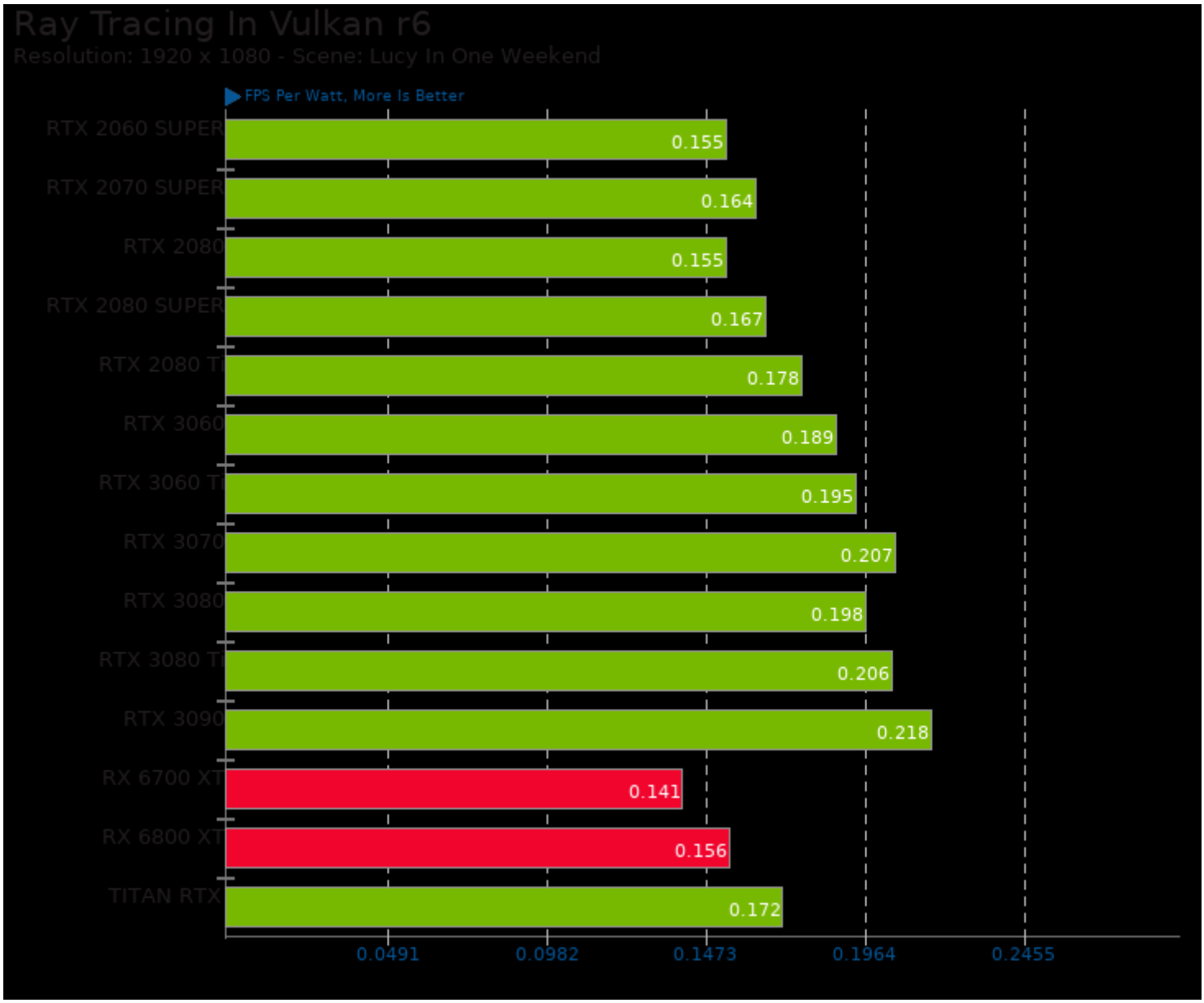
Vulkan Ray-Tracing GPUs



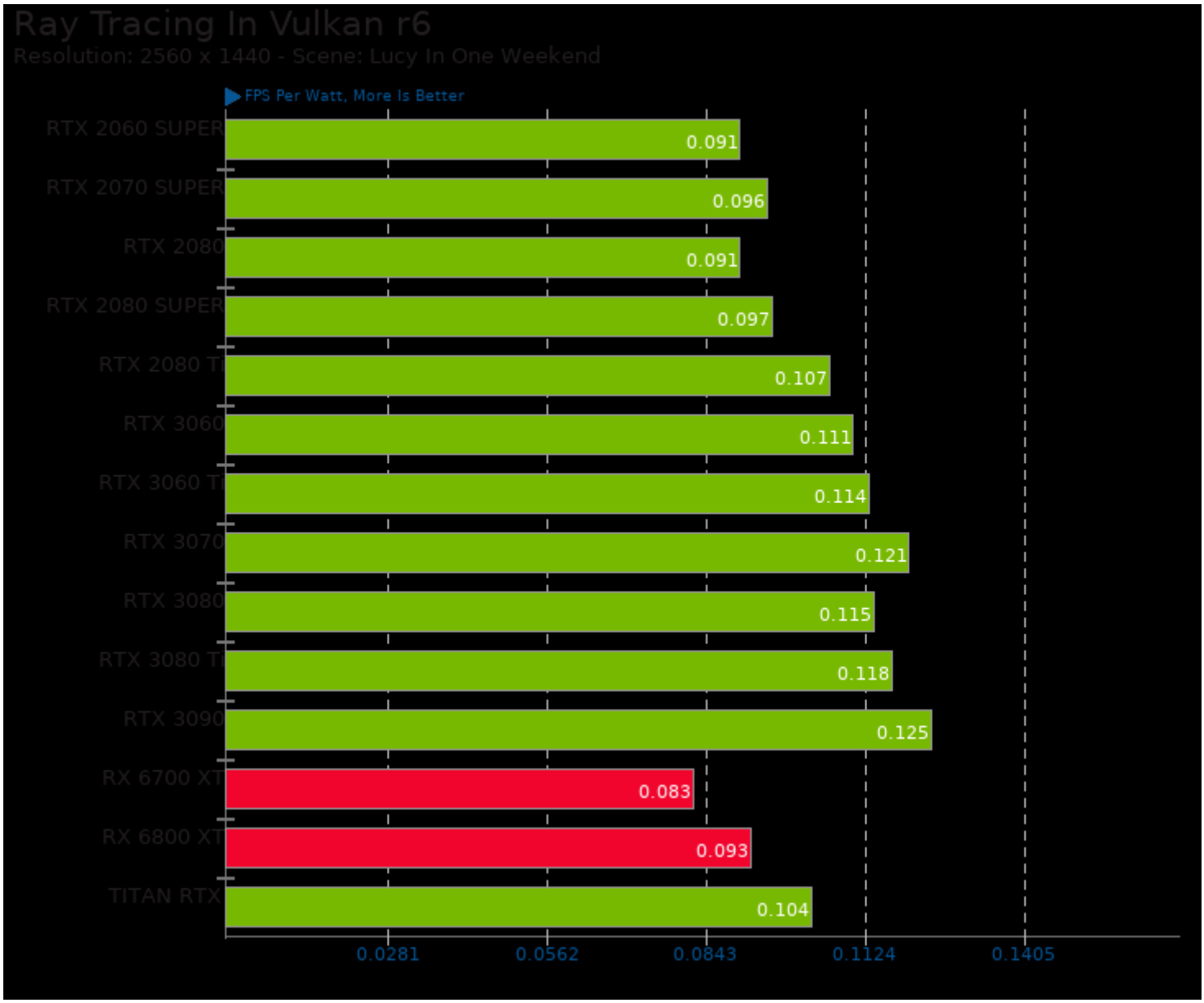
Vulkan Ray-Tracing GPUs



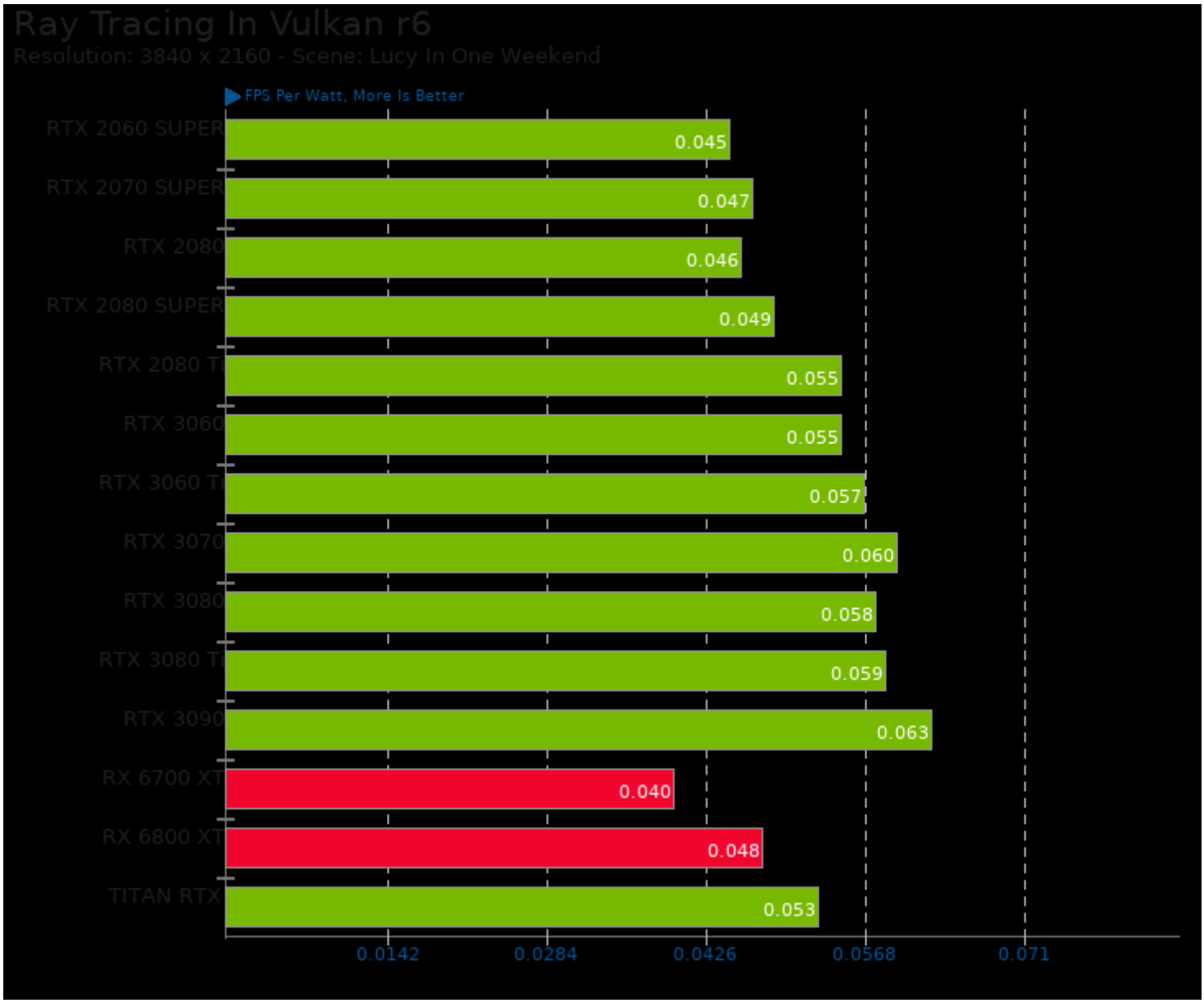
Vulkan Ray-Tracing GPUs



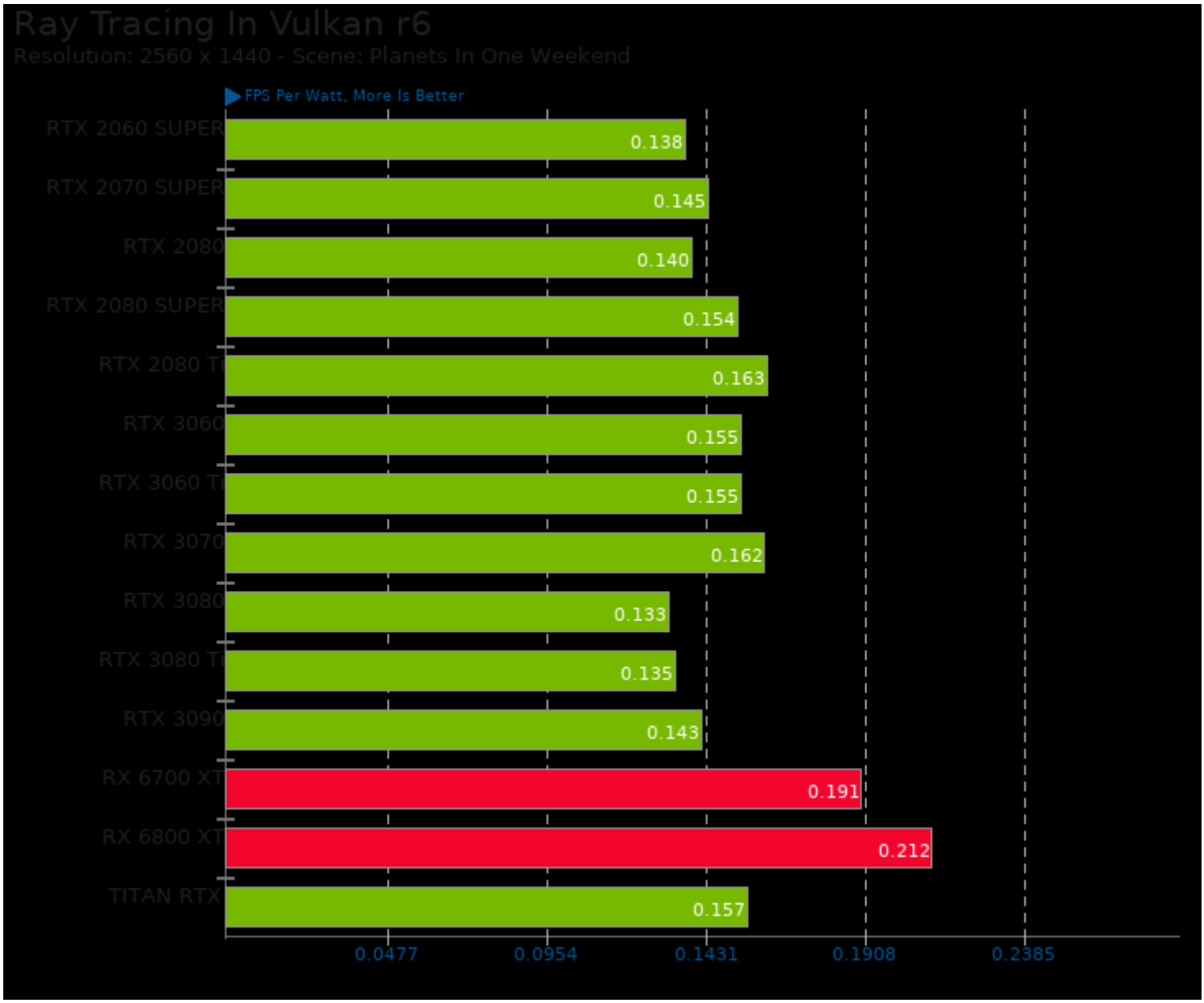
Vulkan Ray-Tracing GPUs



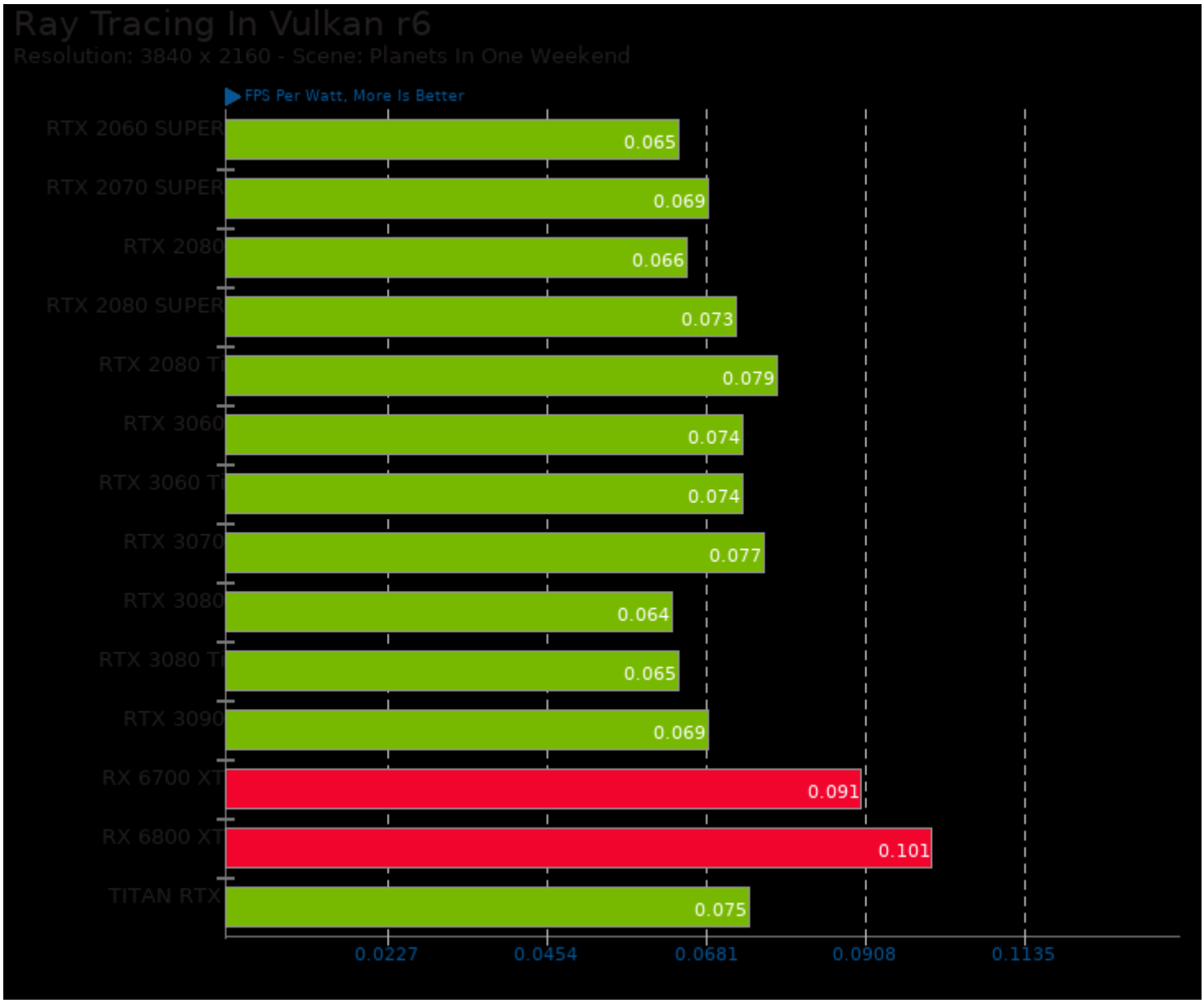
Vulkan Ray-Tracing GPUs



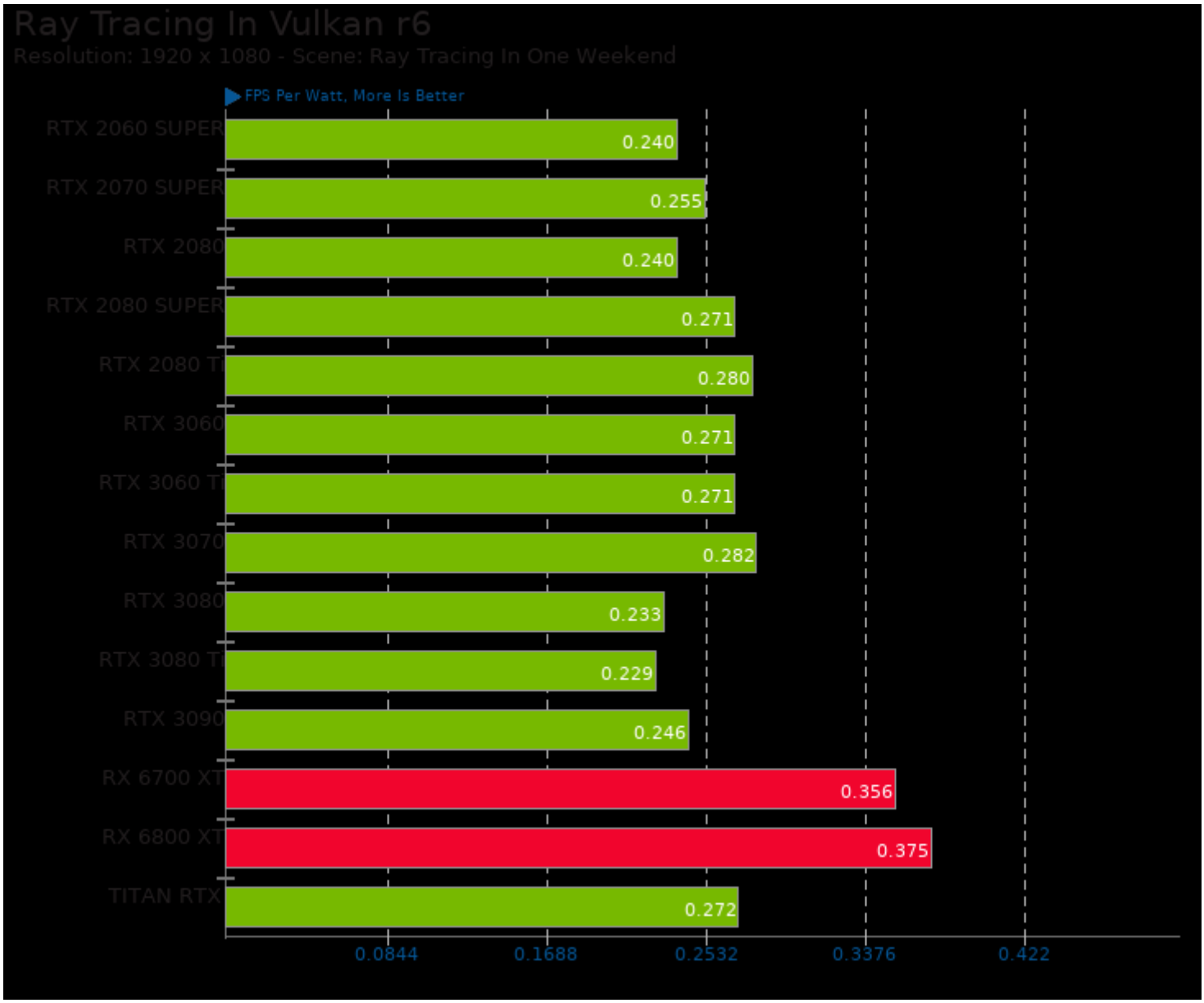
Vulkan Ray-Tracing GPUs

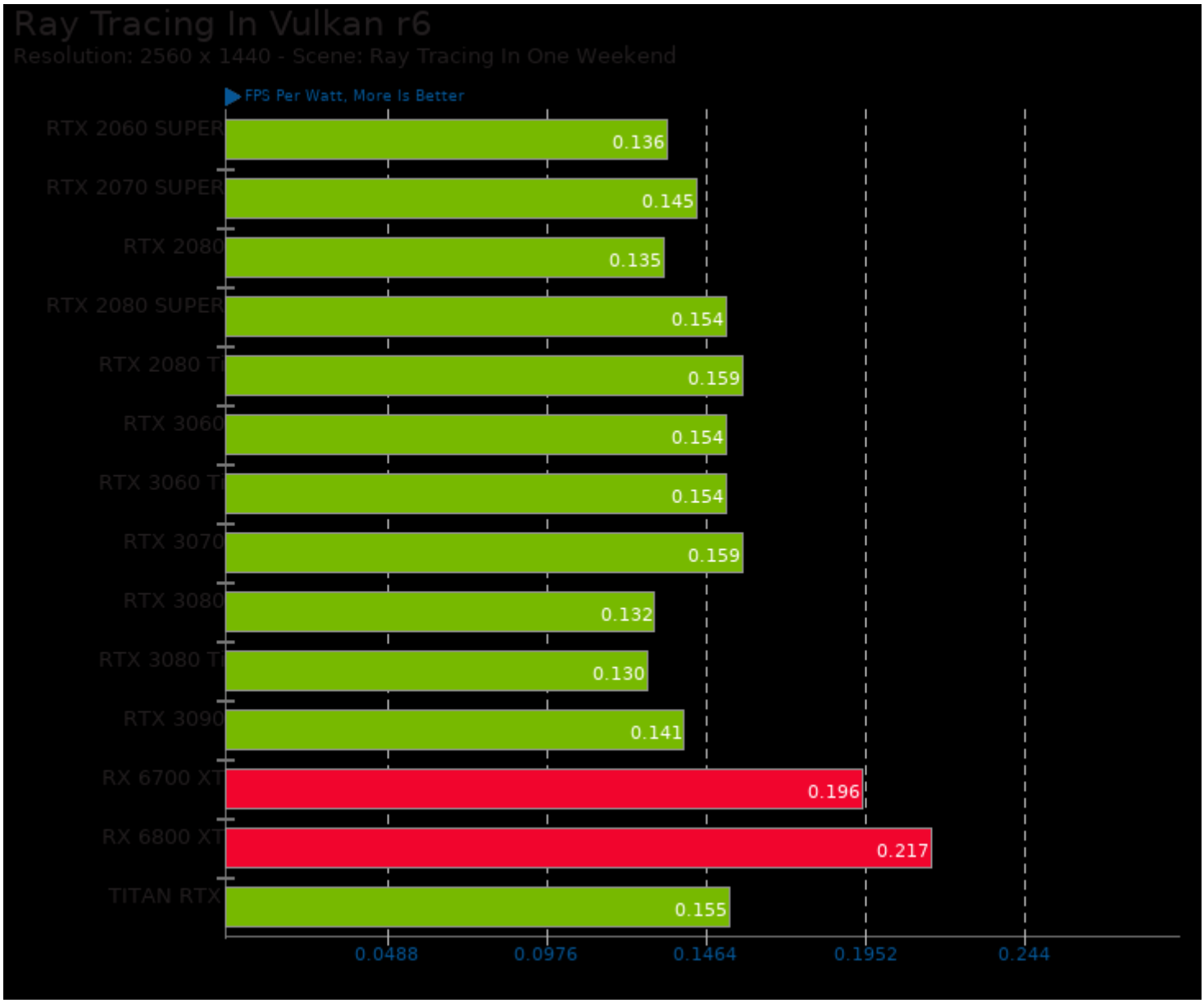


Vulkan Ray-Tracing GPUs

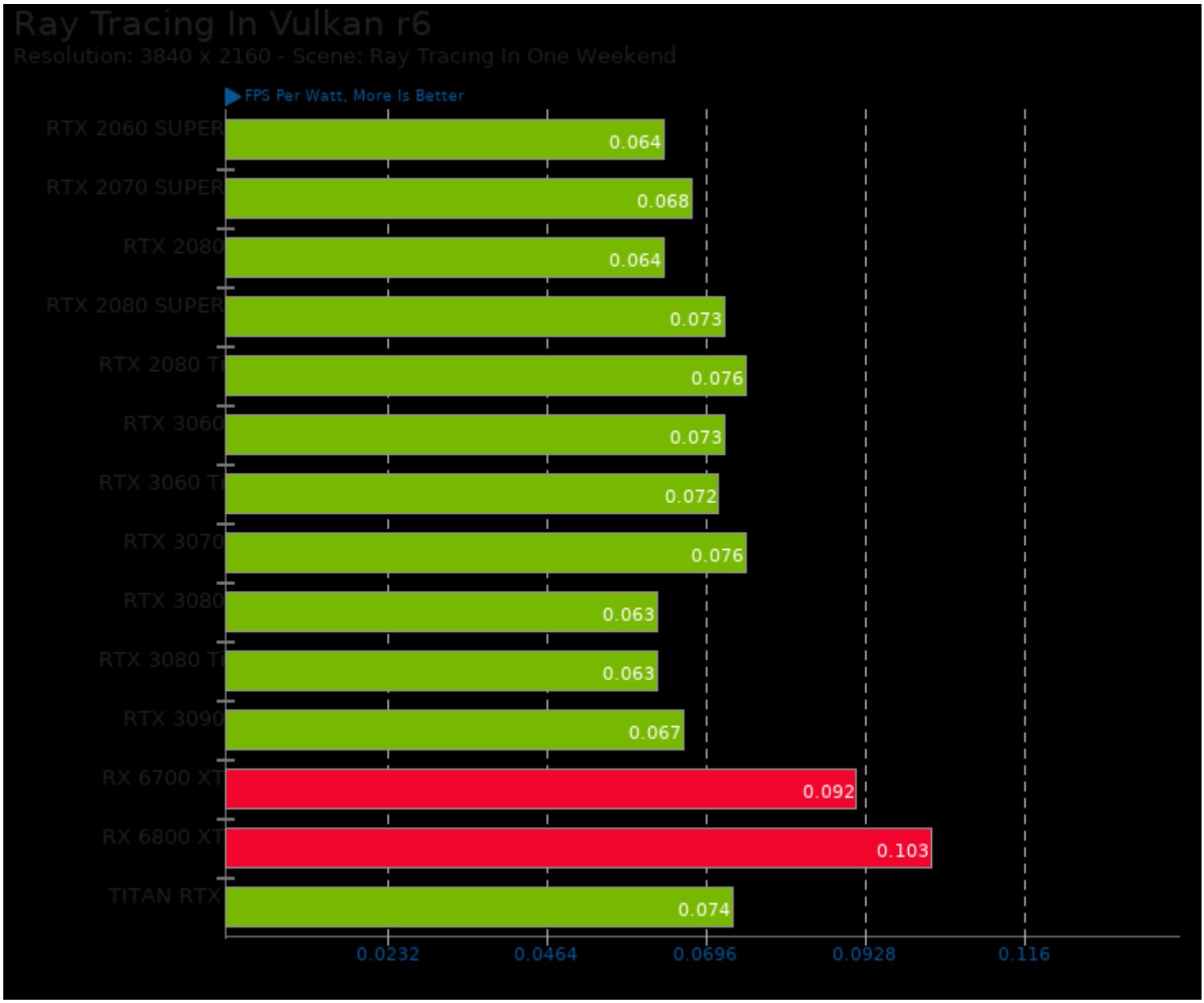


Vulkan Ray-Tracing GPUs

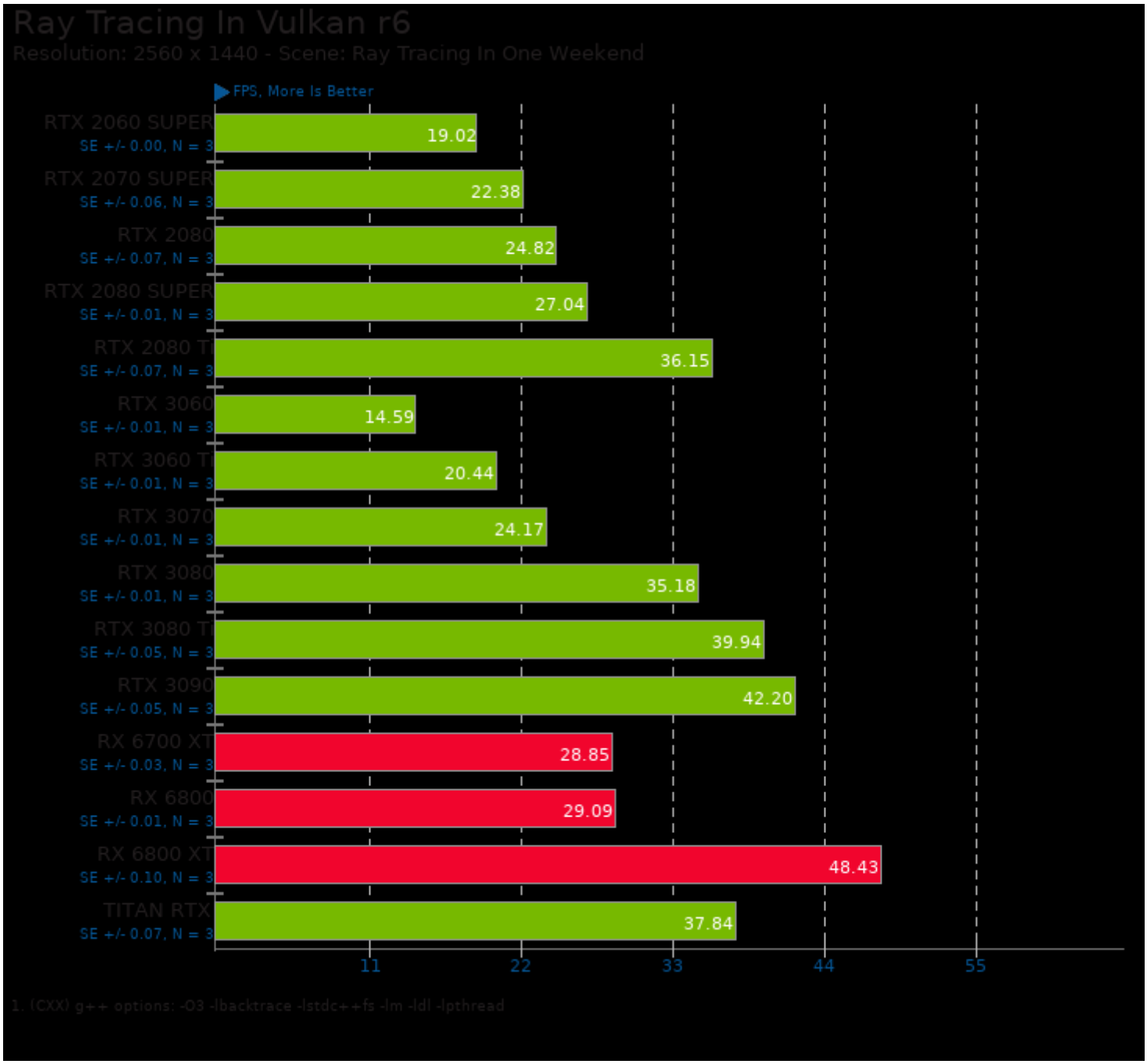



Ray Tracing In Vulkan r6
Resolution: 2560 x 1440 - Scene: Ray Tracing In One Weekend
FPS Per Watt, More Is Better
RTX 2060 SUPER
0.136
RTX 2070 SUPER
0.145
RTX 2080
0.135
RTX 2080 SUPER
0.154
RTX 2080 Ti
0.159
RTX 3060
0.154
RTX 3060 Ti
0.154
RTX 3070
0.159
RTX 3080
0.132
RTX 3080 Ti
0.130
RTX 3090
0.141
RX 6700 XT
0.196
RX 6800 XT
0.217
TITAN RTX
0.155
0.0488
0.0976
0.1464
0.1952
0.244

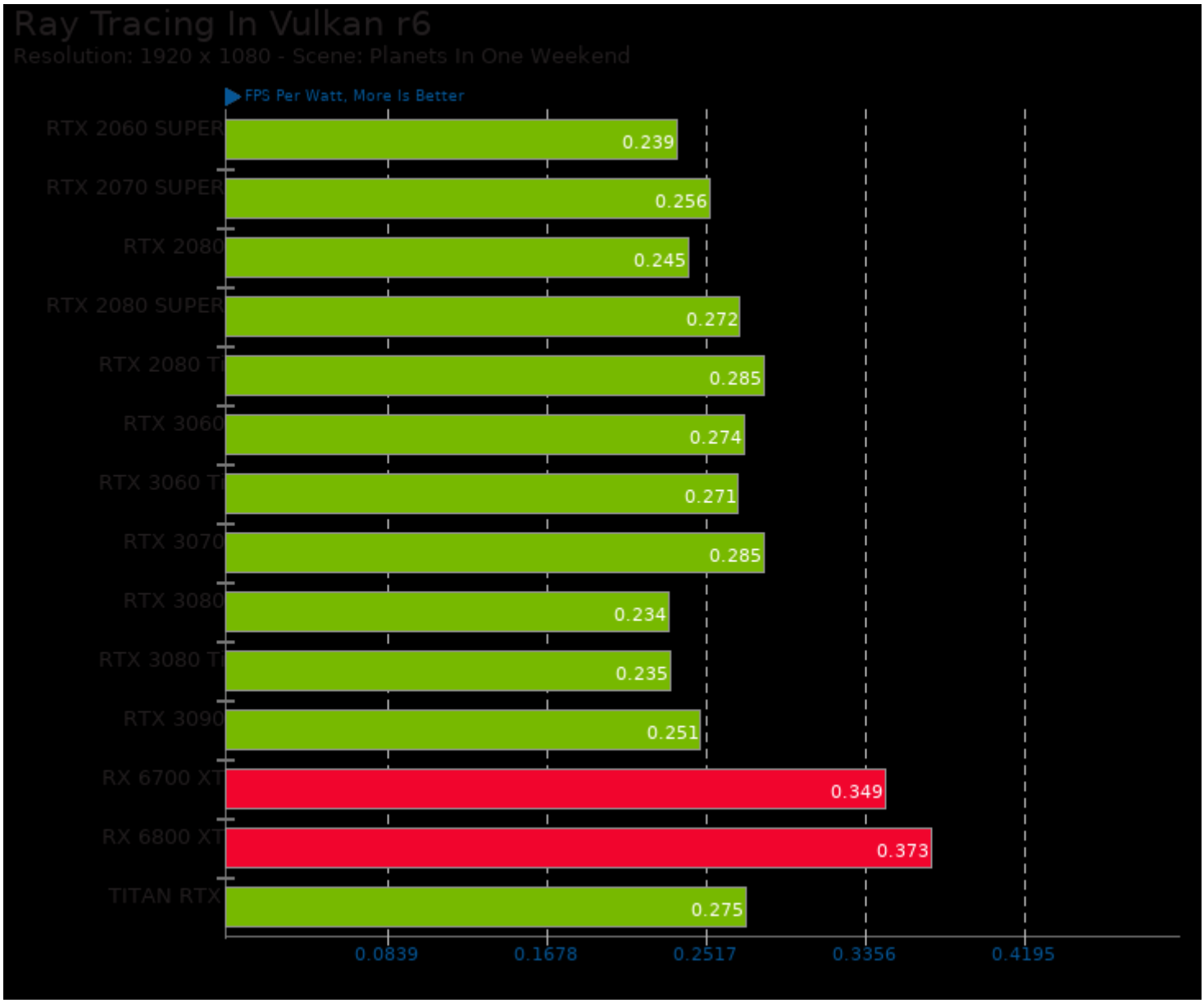
Vulkan Ray-Tracing GPUs



Vulkan Ray-Tracing GPUs



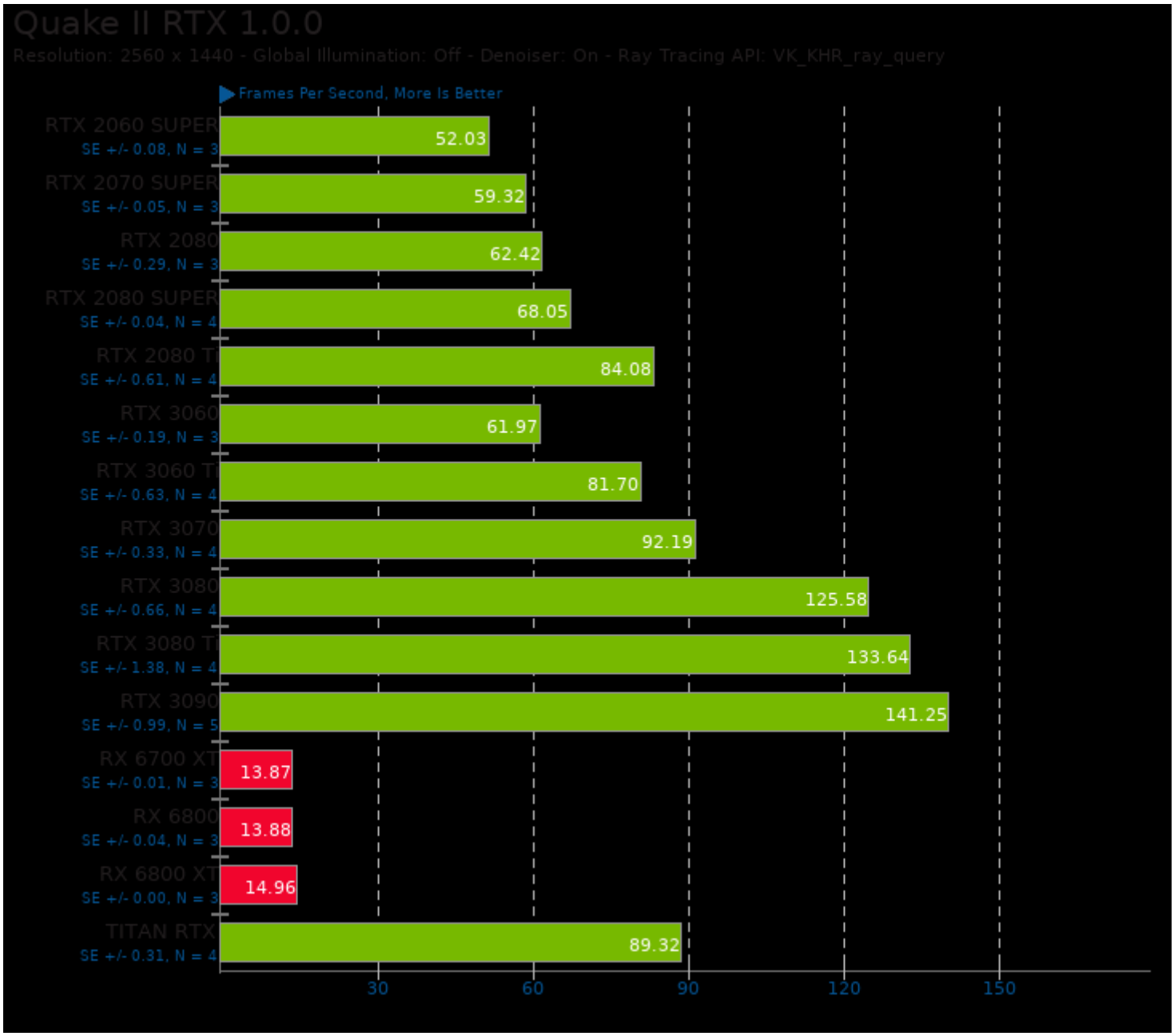
Vulkan Ray-Tracing GPUs

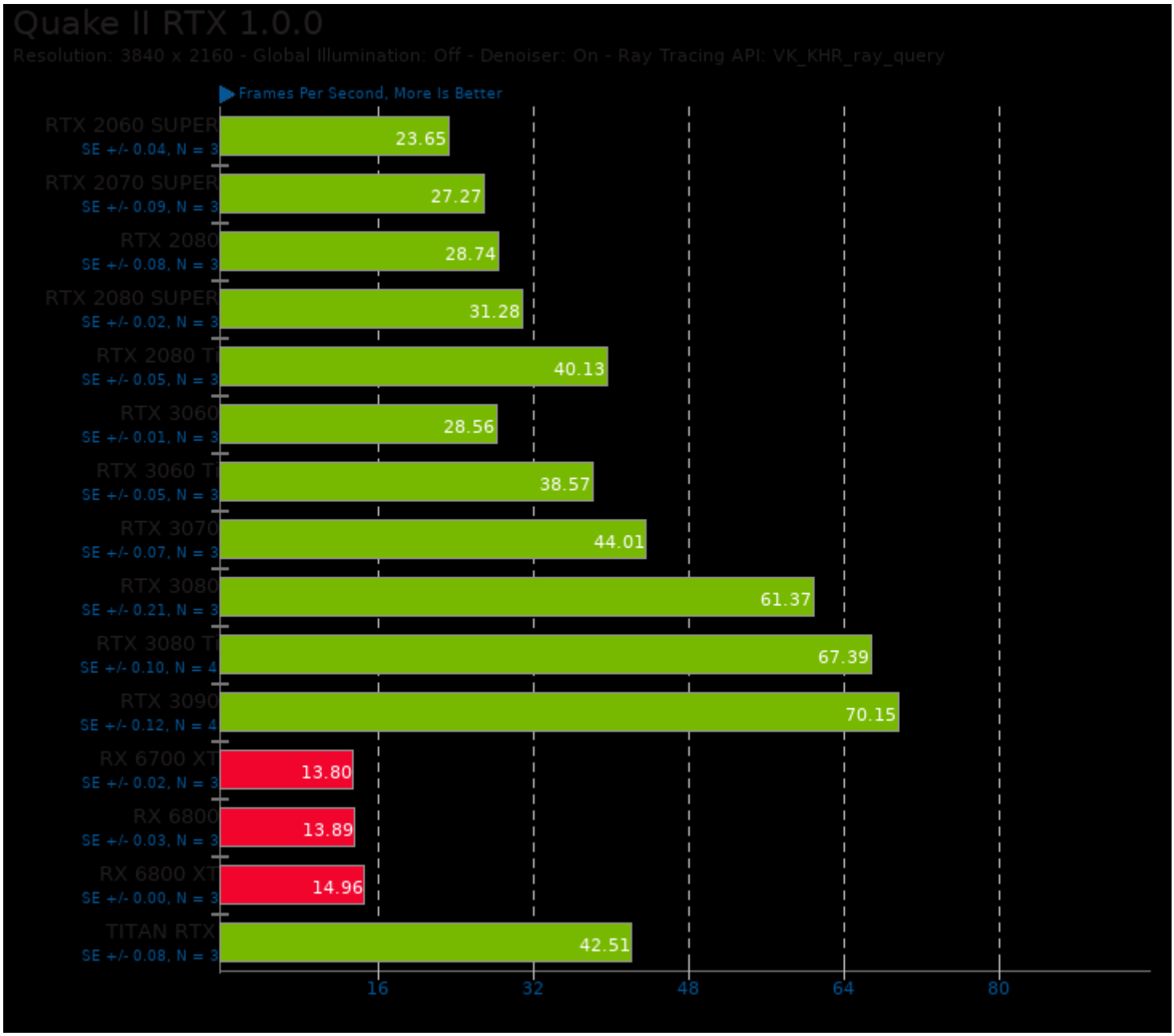


Vulkan Ray-Tracing GPUs

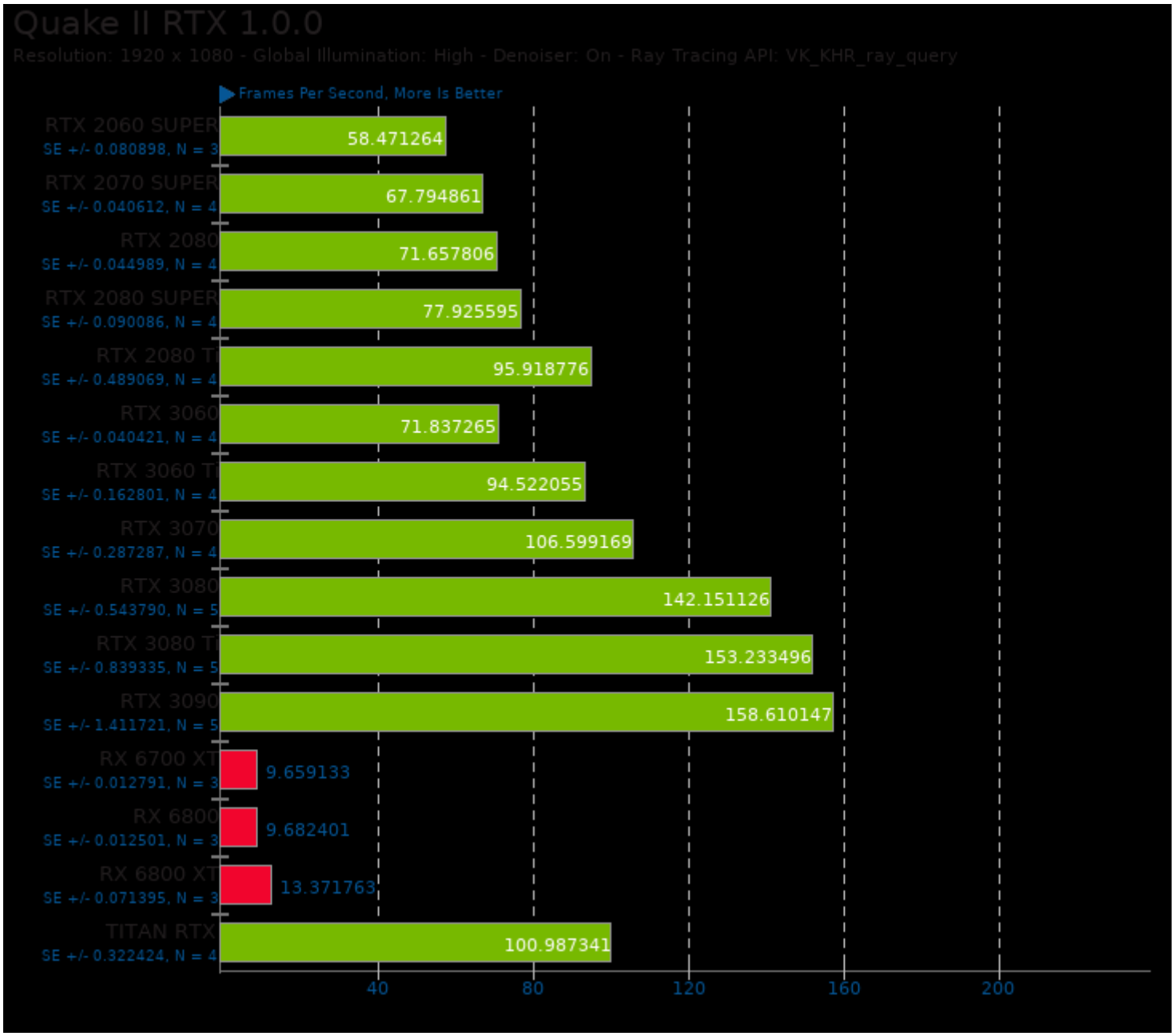


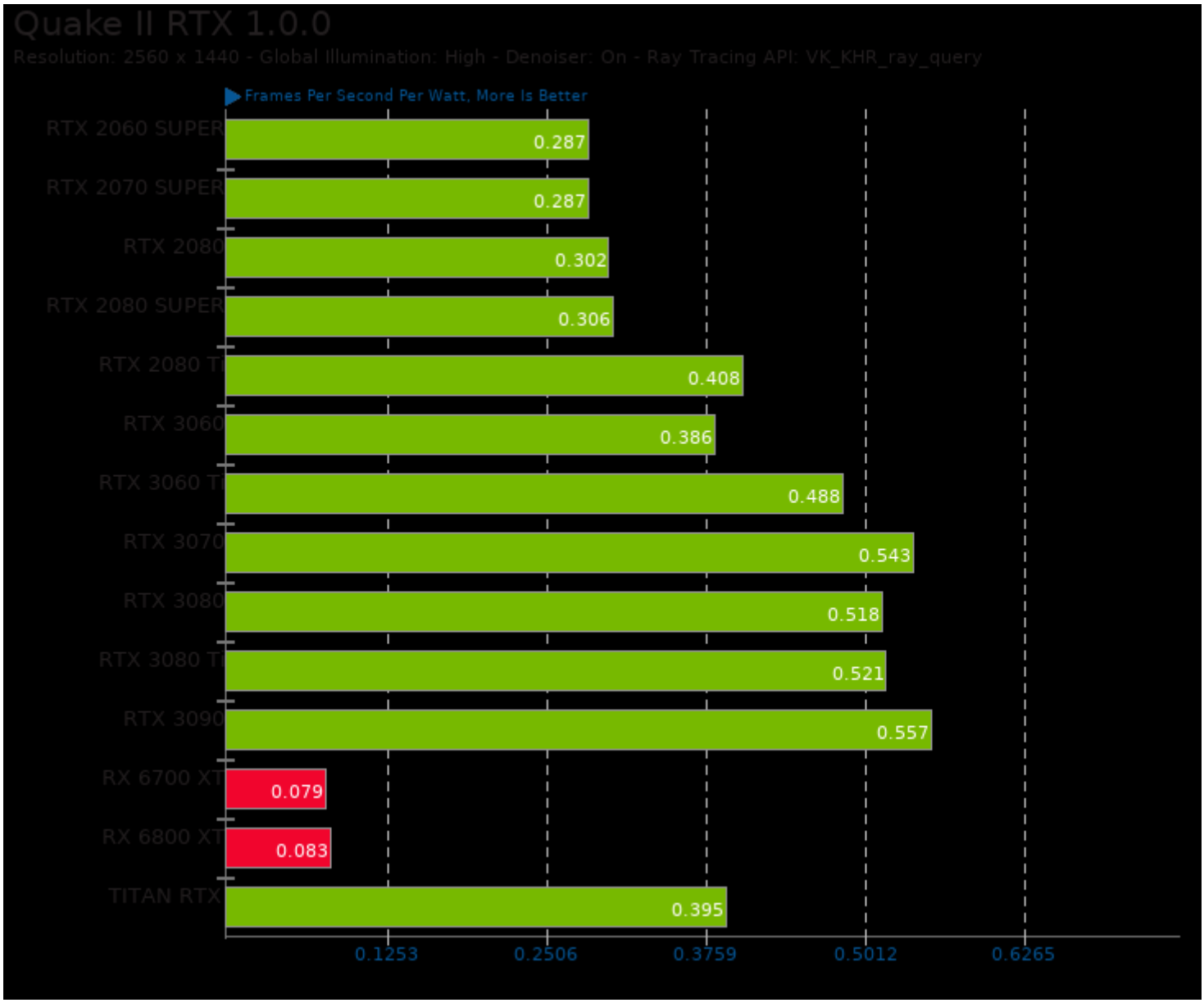
Vulkan Ray-Tracing GPUs

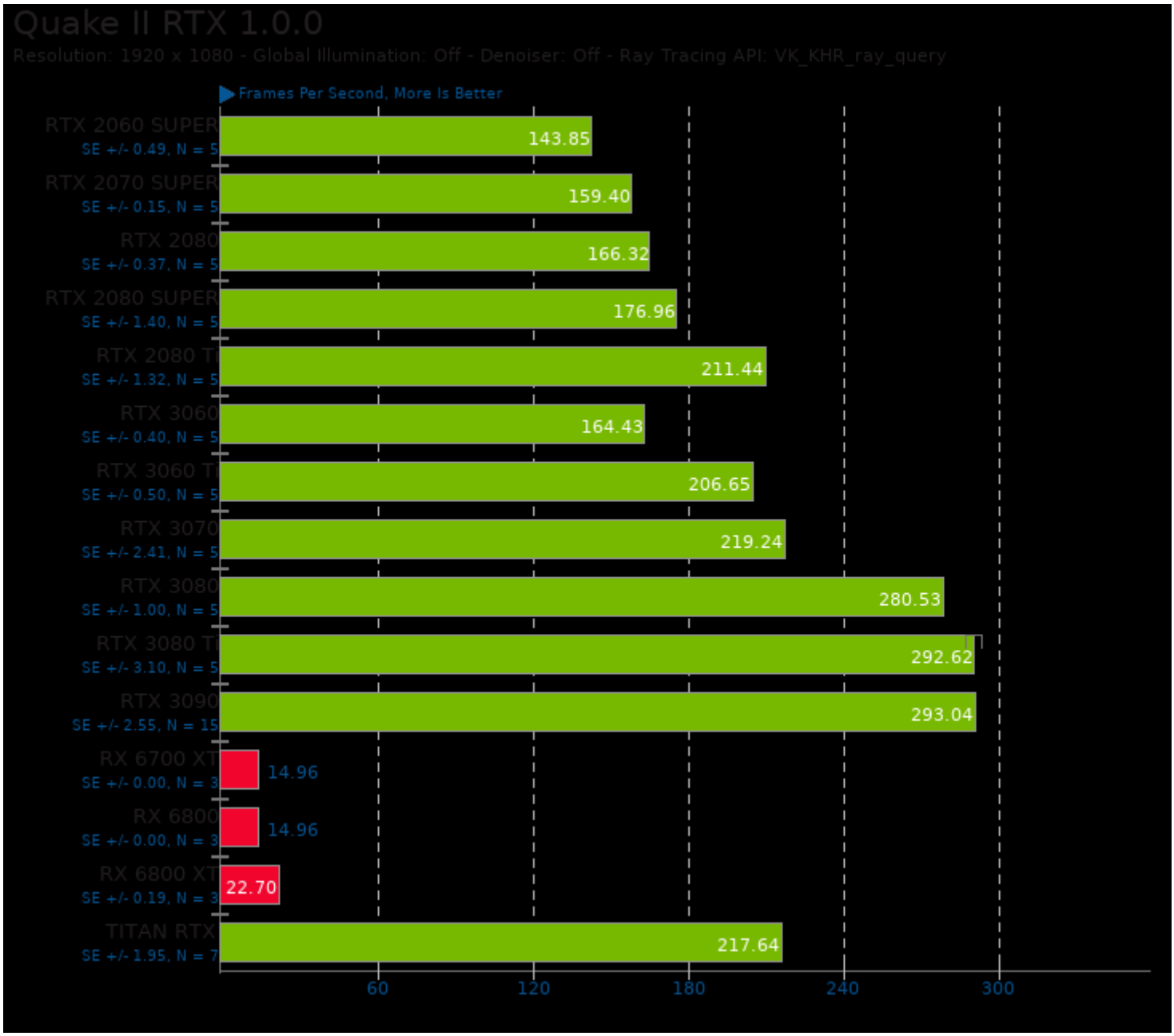


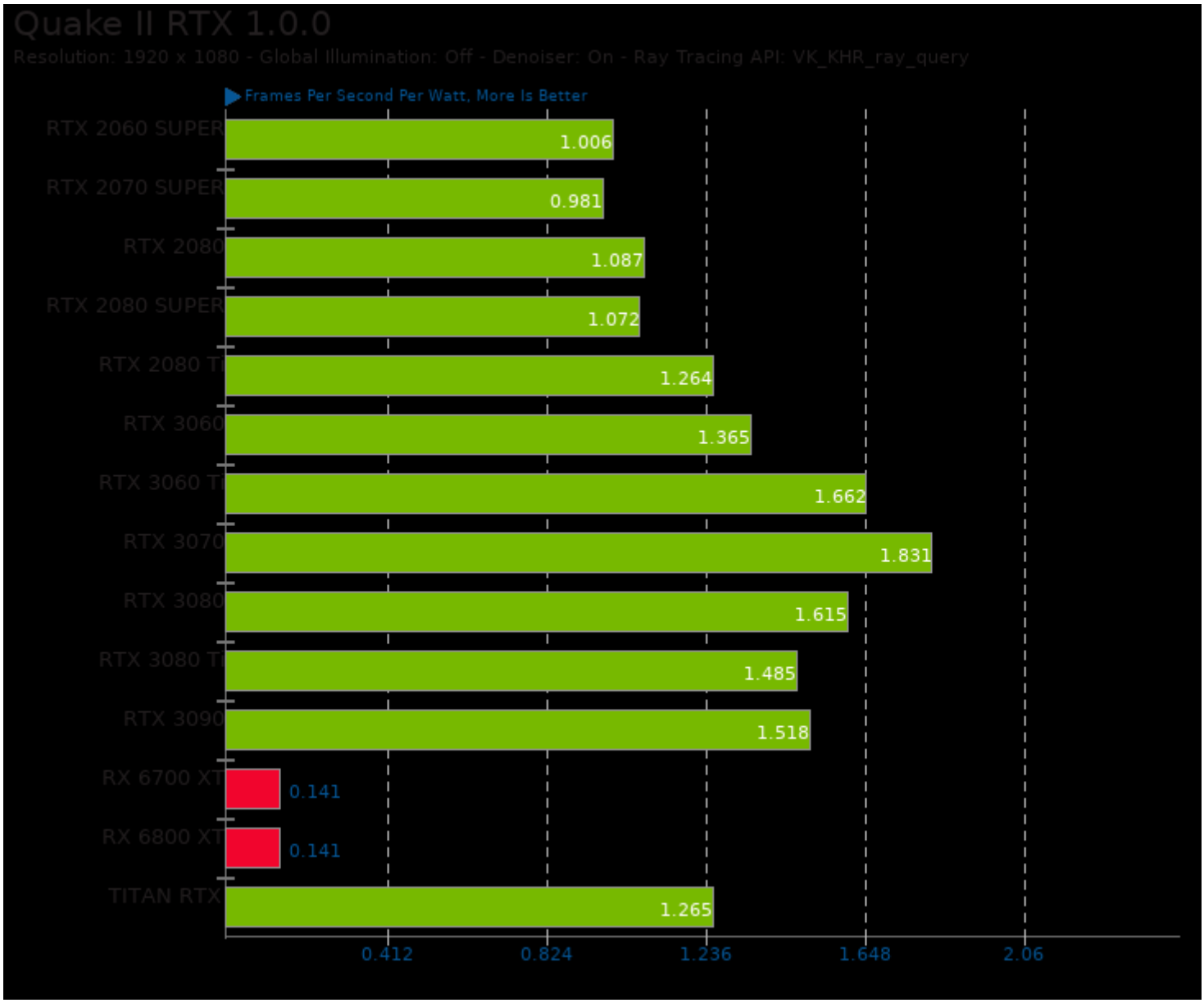

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.04, N = 3
23.65
RTX 2070 SUPER
SE +/- 0.09, N = 3
27.27
RTX 2080
SE +/- 0.08, N = 3
28.74
RTX 2080 SUPER
SE +/- 0.02, N = 3
31.28
RTX 2080 Ti
SE +/- 0.05, N = 3
40.13
RTX 3060
SE +/- 0.01, N = 3
28.56
RTX 3060 Ti
SE +/- 0.05, N = 3
38.57
RTX 3070
SE +/- 0.07, N = 3
44.01
RTX 3080
SE +/- 0.21, N = 3
61.37
RTX 3080 Ti
SE +/- 0.10, N = 4
67.39
RTX 3090
SE +/- 0.12, N = 4
70.15
RX 6700 XT
SE +/- 0.02, N = 3
13.80
RX 6800
SE +/- 0.03, N = 3
13.89
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 0.08, N = 3
42.51
16
32
48
64
80

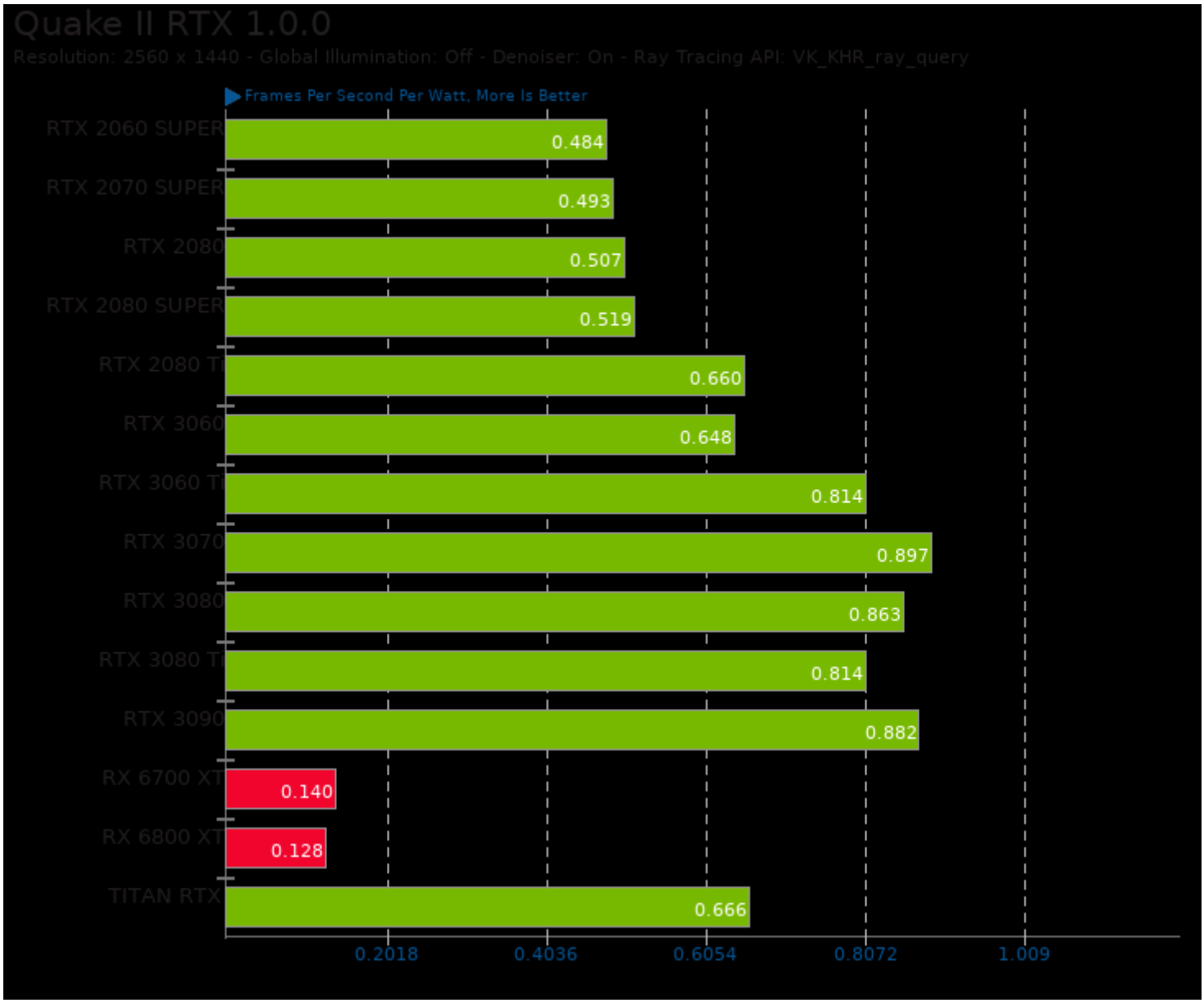
Vulkan Ray-Tracing GPUs

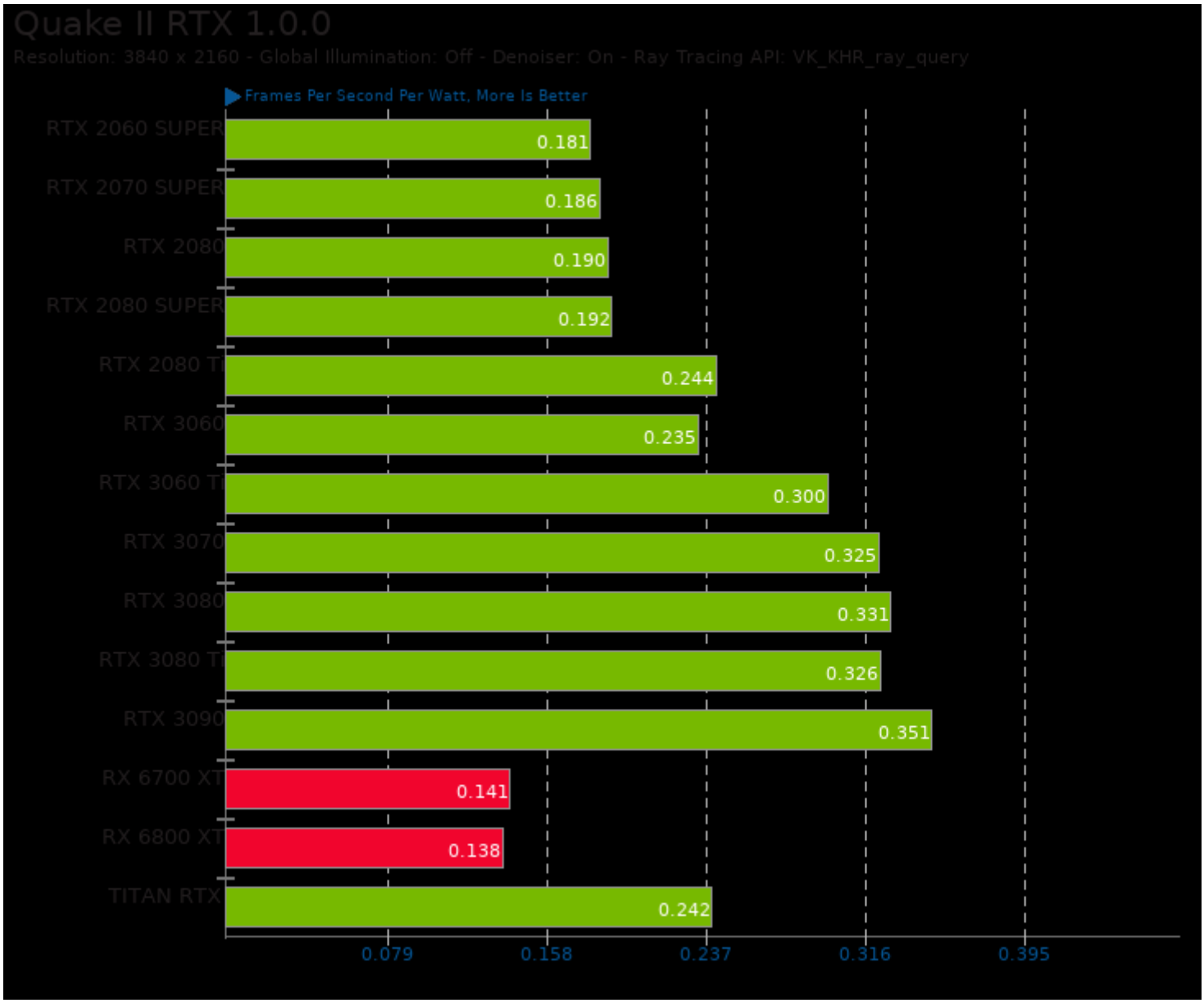


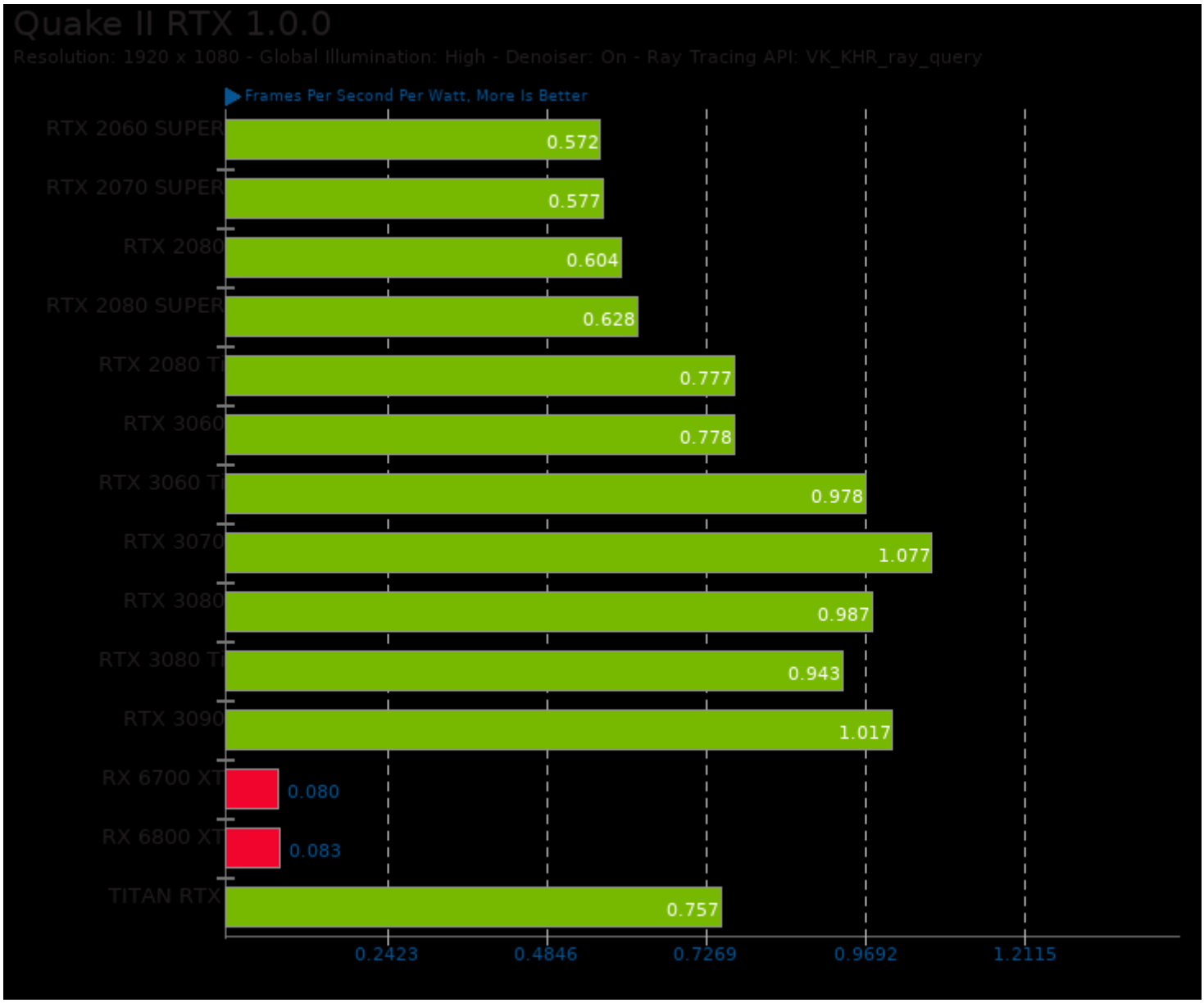

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.287
RTX 2070 SUPER
0.287
RTX 2080
0.302
RTX 2080 SUPER
0.306
RTX 2080 Ti
0.408
RTX 3060
0.386
RTX 3060 Ti
0.488
RTX 3070
0.543
RTX 3080
0.518
RTX 3080 Ti
0.521
RTX 3090
0.557
RX 6700 XT
0.079
RX 6800 XT
0.083
TITAN RTX
0.395
0.1253
0.2506
0.3759
0.5012
0.6265

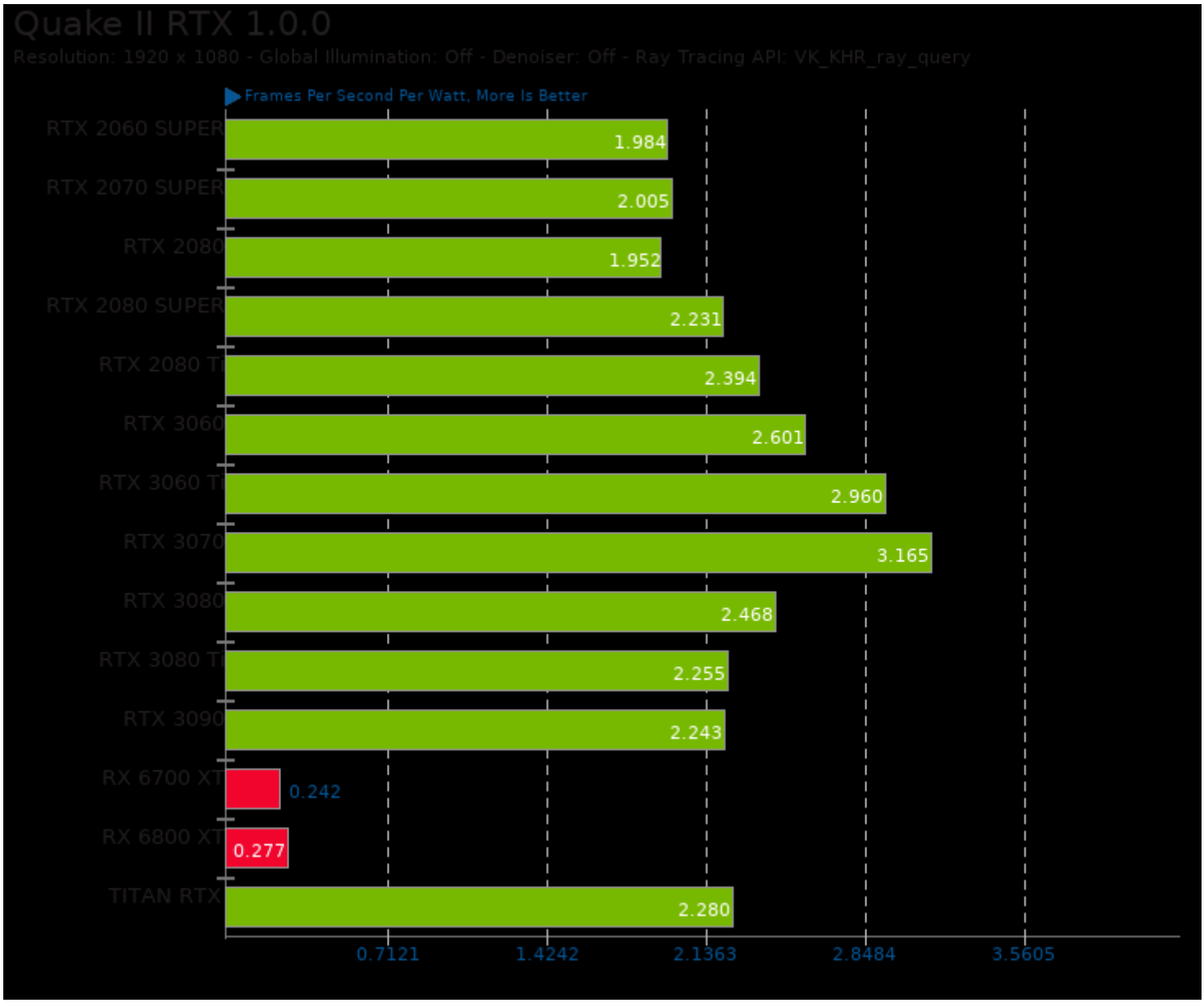

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.49, N = 5
143.85
RTX 2070 SUPER
SE +/- 0.15, N = 5
159.40
RTX 2080
SE +/- 0.37, N = 5
166.32
RTX 2080 SUPER
SE +/- 1.40, N = 5
176.96
RTX 2080 Ti
SE +/- 1.32, N = 5
211.44
RTX 3060
SE +/- 0.40, N = 5
164.43
RTX 3060 Ti
SE +/- 0.50, N = 5
206.65
RTX 3070
SE +/- 2.41, N = 5
219.24
RTX 3080
SE +/- 1.00, N = 5
280.53
RTX 3080 Ti
SE +/- 3.10, N = 5
292.62
RTX 3090
SE +/- 2.55, N = 15
293.04
RX 6700 XT
SE +/- 0.00, N = 3
14.96
RX 6800
SE +/- 0.00, N = 3
14.96
RX 6800 XT
SE +/- 0.19, N = 3
22.70
TITAN RTX
SE +/- 1.95, N = 7
217.64
60
120
180
240
300

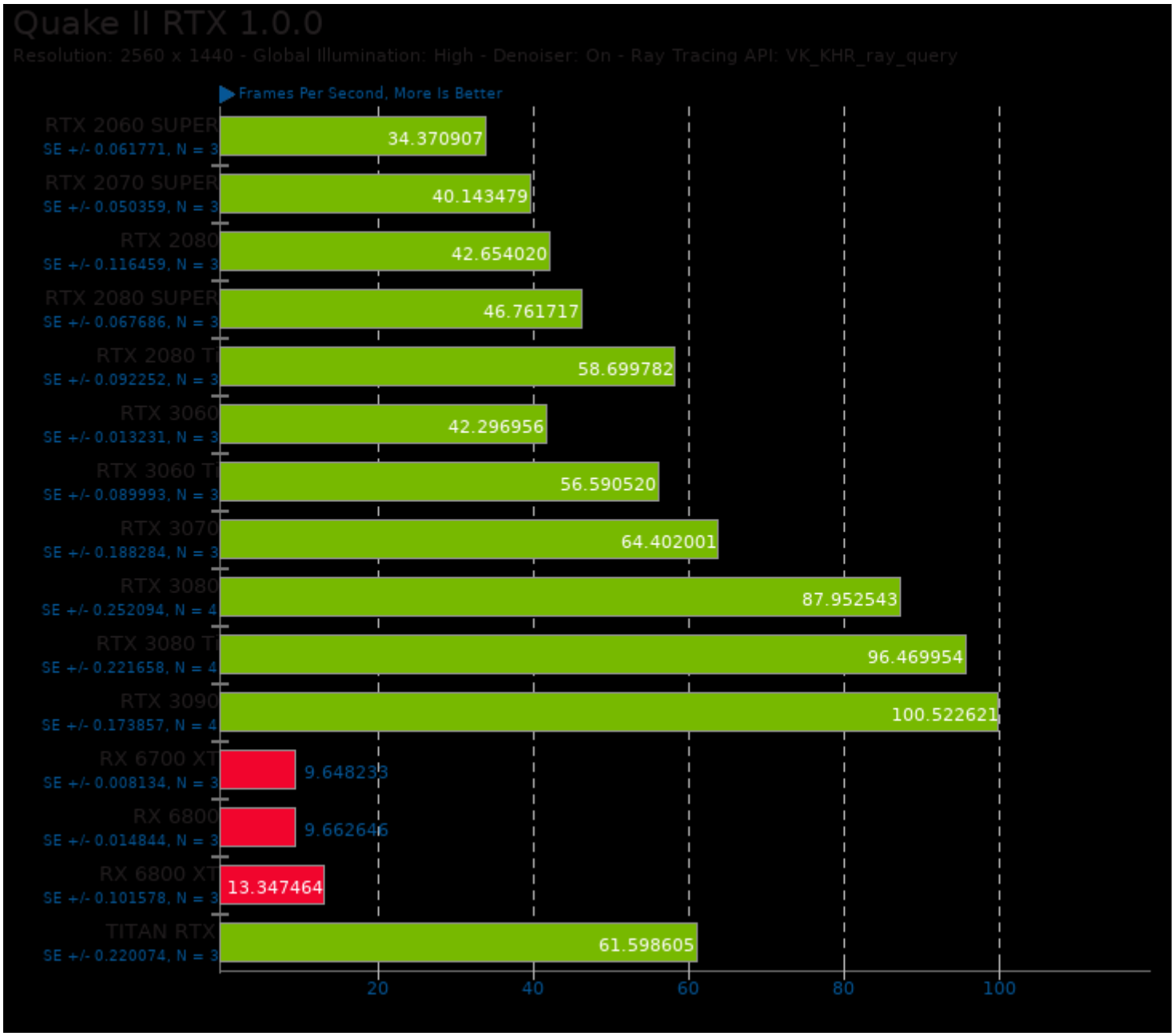

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
1.006
RTX 2070 SUPER
0.981
RTX 2080
1.087
RTX 2080 SUPER
1.072
RTX 2080 Ti
1.264
RTX 3060
1.365
RTX 3060 Ti
1.662
RTX 3070
1.831
RTX 3080
1.615
RTX 3080 Ti
1.485
RTX 3090
1.518
RX 6700 XT
0.141
RX 6800 XT
0.141
TITAN RTX
1.265
0.412
0.824
1.236
1.648
2.06


Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.484
RTX 2070 SUPER
0.493
RTX 2080
0.507
RTX 2080 SUPER
0.519
RTX 2080 Ti
0.660
RTX 3060
0.648
RTX 3060 Ti
0.814
RTX 3070
0.897
RTX 3080
0.863
RTX 3080 Ti
0.814
RTX 3090
0.882
RX 6700 XT
0.140
RX 6800 XT
0.128
TITAN RTX
0.666
0.2018
0.4036
0.6054
0.8072
1.009

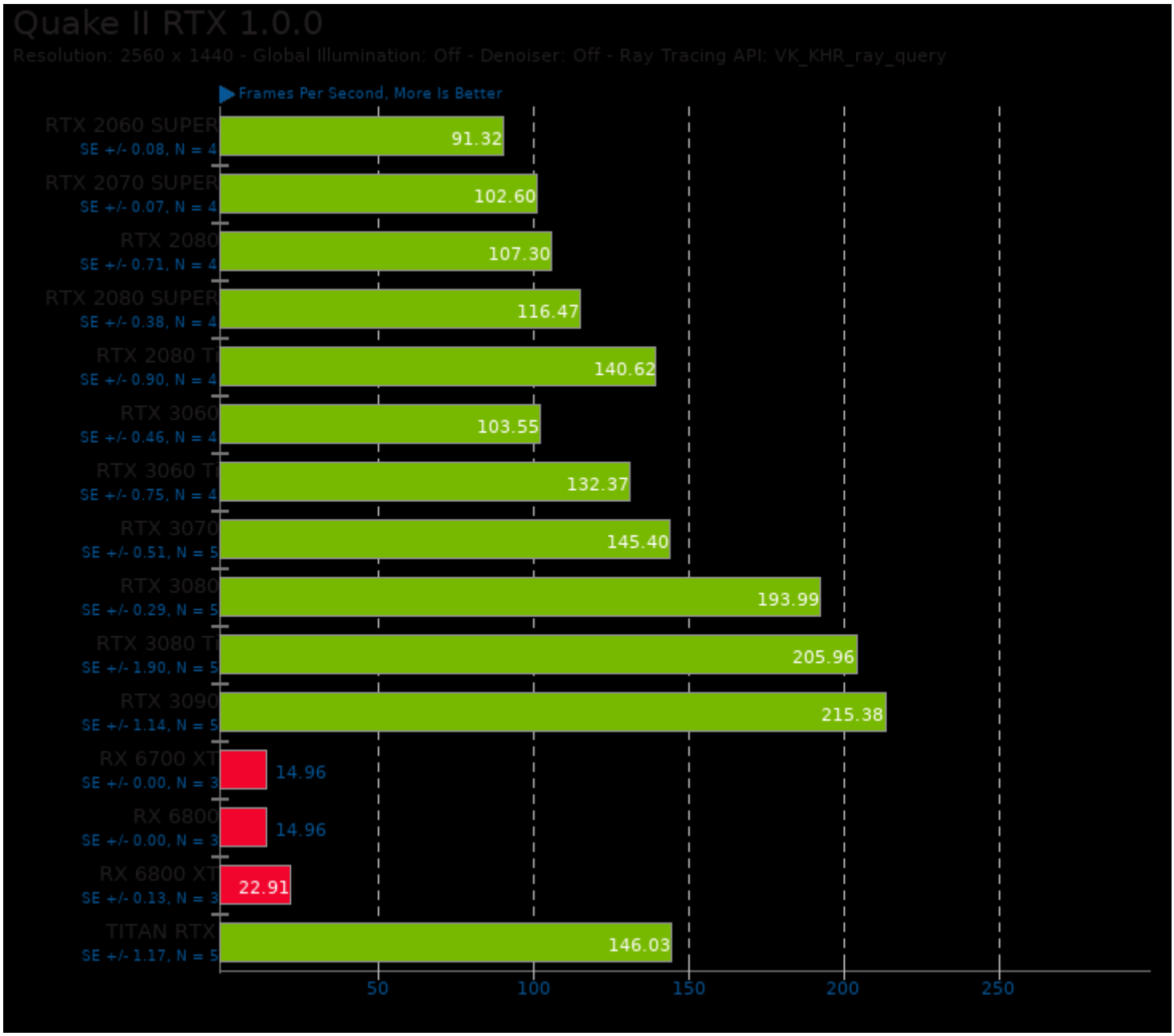

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.181
RTX 2070 SUPER
0.186
RTX 2080
0.190
RTX 2080 SUPER
0.192
RTX 2080 Ti
0.244
RTX 3060
0.235
RTX 3060 Ti
0.300
RTX 3070
0.325
RTX 3080
0.331
RTX 3080 Ti
0.326
RTX 3090
0.351
RX 6700 XT
0.141
RX 6800 XT
0.138
TITAN RTX
0.242
0.079
0.158
0.237
0.316
0.395

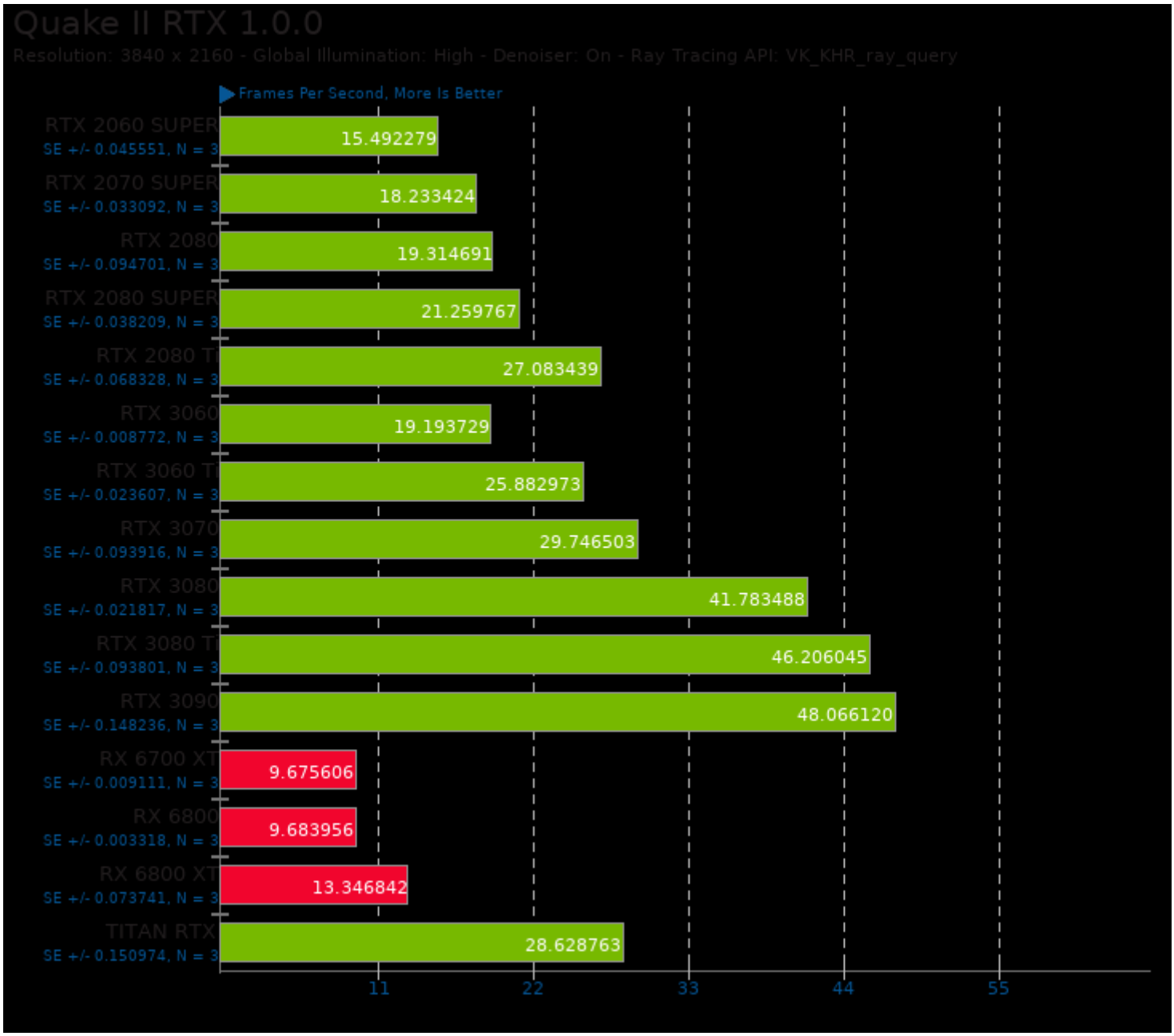

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.572
RTX 2070 SUPER
0.577
RTX 2080
0.604
RTX 2080 SUPER
0.628
RTX 2080 Ti
0.777
RTX 3060
0.778
RTX 3060 Ti
0.978
RTX 3070
1.077
RTX 3080
0.987
RTX 3080 Ti
0.943
RTX 3090
1.017
RX 6700 XT
0.080
RX 6800 XT
0.083
TITAN RTX
0.757
0.2423
0.4846
0.7269
0.9692
1.2115


Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
1.984
RTX 2070 SUPER
2.005
RTX 2080
1.952
RTX 2080 SUPER
2.231
RTX 2080 Ti
2.394
RTX 3060
2.601
RTX 3060 Ti
2.960
RTX 3070
3.165
RTX 3080
2.468
RTX 3080 Ti
2.255
RTX 3090
2.243
RX 6700 XT
0.242
RX 6800 XT
0.277
TITAN RTX
2.280
0.7121
1.4242
2.1363
2.8484
3.5605

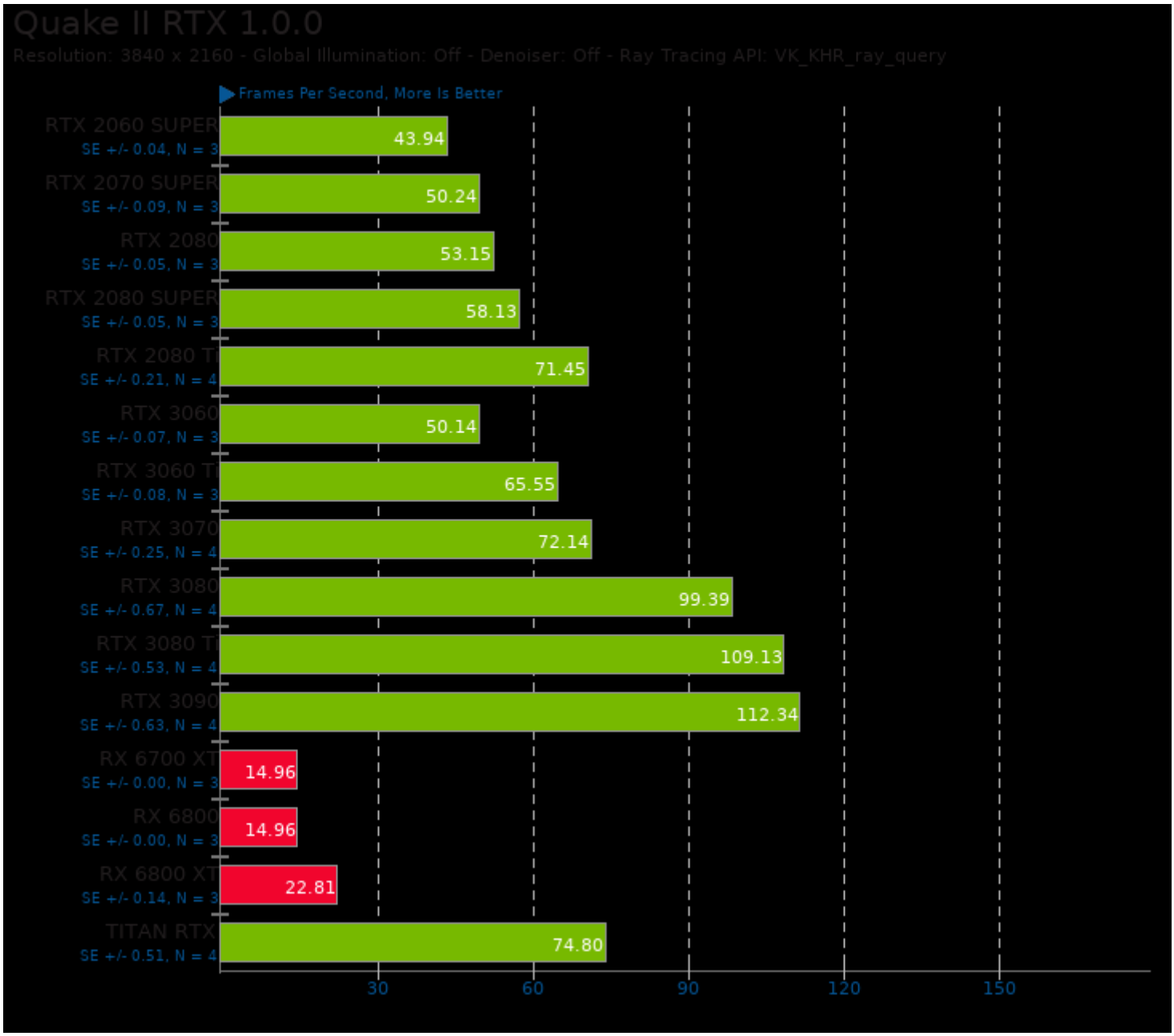

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.061771, N = 3
34.370907
RTX 2070 SUPER
SE +/- 0.050359, N = 3
40.143479
RTX 2080
SE +/- 0.116459, N = 3
42.654020
RTX 2080 SUPER
SE +/- 0.067686, N = 3
46.761717
RTX 2080 Ti
SE +/- 0.092252, N = 3
58.699782
RTX 3060
SE +/- 0.013231, N = 3
42.296956
RTX 3060 Ti
SE +/- 0.089993, N = 3
56.590520
RTX 3070
SE +/- 0.188284, N = 3
64.402001
RTX 3080
SE +/- 0.252094, N = 4
87.952543
RTX 3080 Ti
SE +/- 0.221658, N = 4
96.469954
RTX 3090
SE +/- 0.173857, N = 4
100.522621
RX 6700 XT
SE +/- 0.008134, N = 3
9.648233
RX 6800
SE +/- 0.014844, N = 3
9.662646
RX 6800 XT
SE +/- 0.101578, N = 3
13.347464
TITAN RTX
SE +/- 0.220074, N = 3
61.598605
20
40
60
80
100

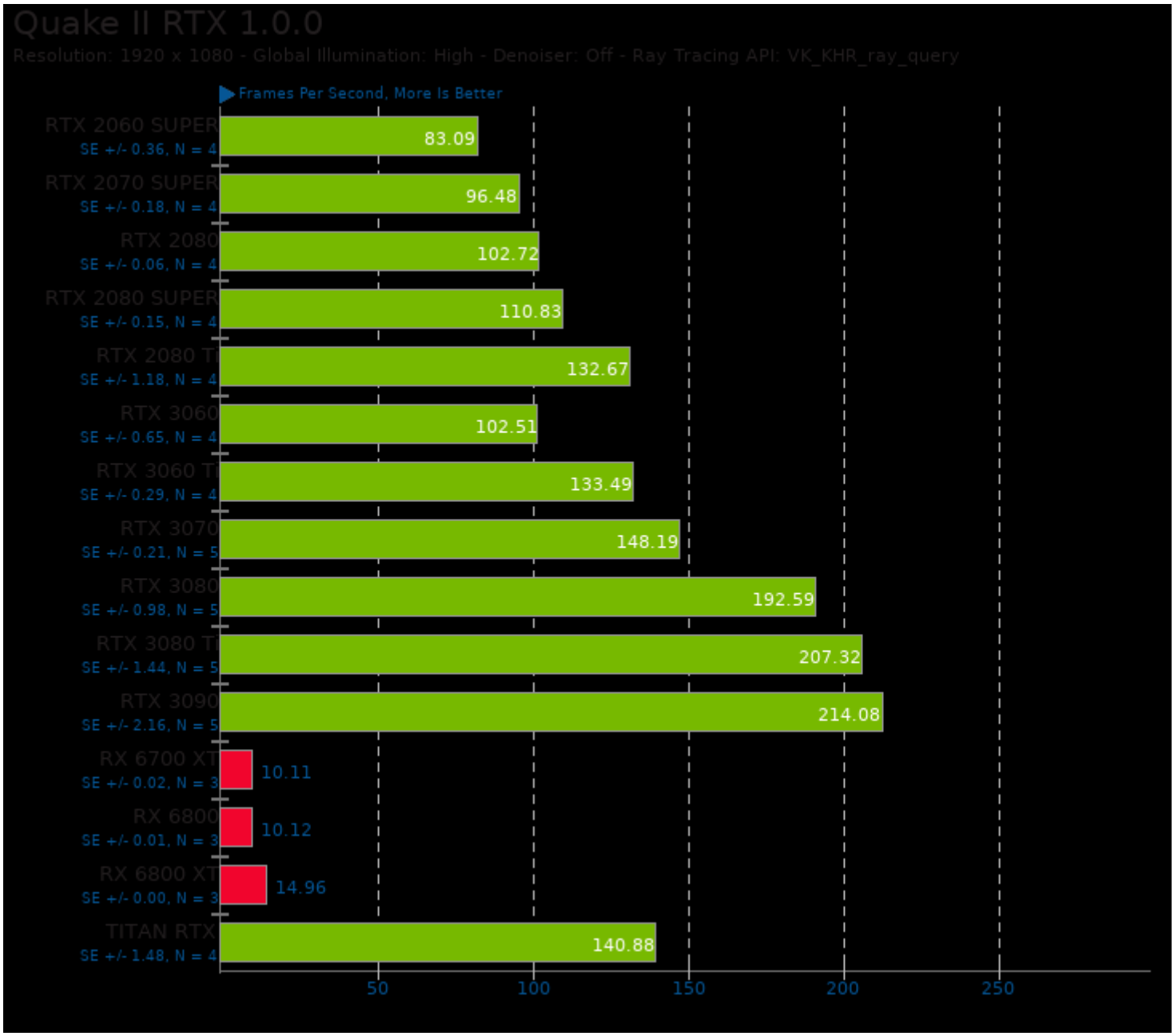
Vulkan Ray-Tracing GPUs

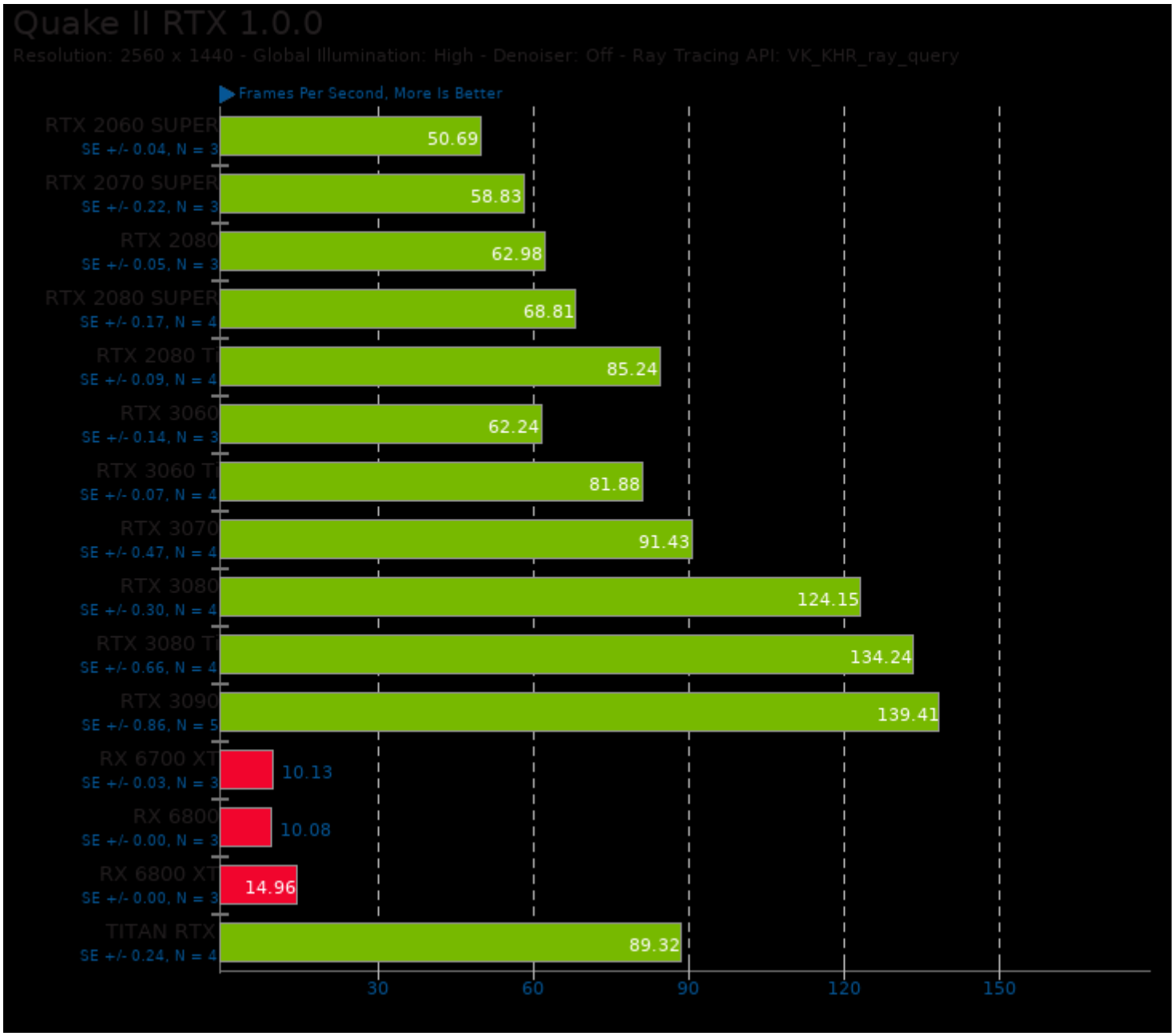



Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.045551, N = 3
15.492279
RTX 2070 SUPER
SE +/- 0.033092, N = 3
18.233424
RTX 2080
SE +/- 0.094701, N = 3
19.314691
RTX 2080 SUPER
SE +/- 0.038209, N = 3
21.259767
RTX 2080 Ti
SE +/- 0.068328, N = 3
27.083439
RTX 3060
SE +/- 0.008772, N = 3
19.193729
RTX 3060 Ti
SE +/- 0.023607, N = 3
25.882973
RTX 3070
SE +/- 0.093916, N = 3
29.746503
RTX 3080
SE +/- 0.021817, N = 3
41.783488
RTX 3080 Ti
SE +/- 0.093801, N = 3
46.206045
RTX 3090
SE +/- 0.148236, N = 3
48.066120
RX 6700 XT
SE +/- 0.009111, N = 3
9.675606
RX 6800
SE +/- 0.003318, N = 3
9.683956
RX 6800 XT
SE +/- 0.073741, N = 3
13.346842
TITAN RTX
SE +/- 0.150974, N = 3
28.628763
11
22
33
44
55

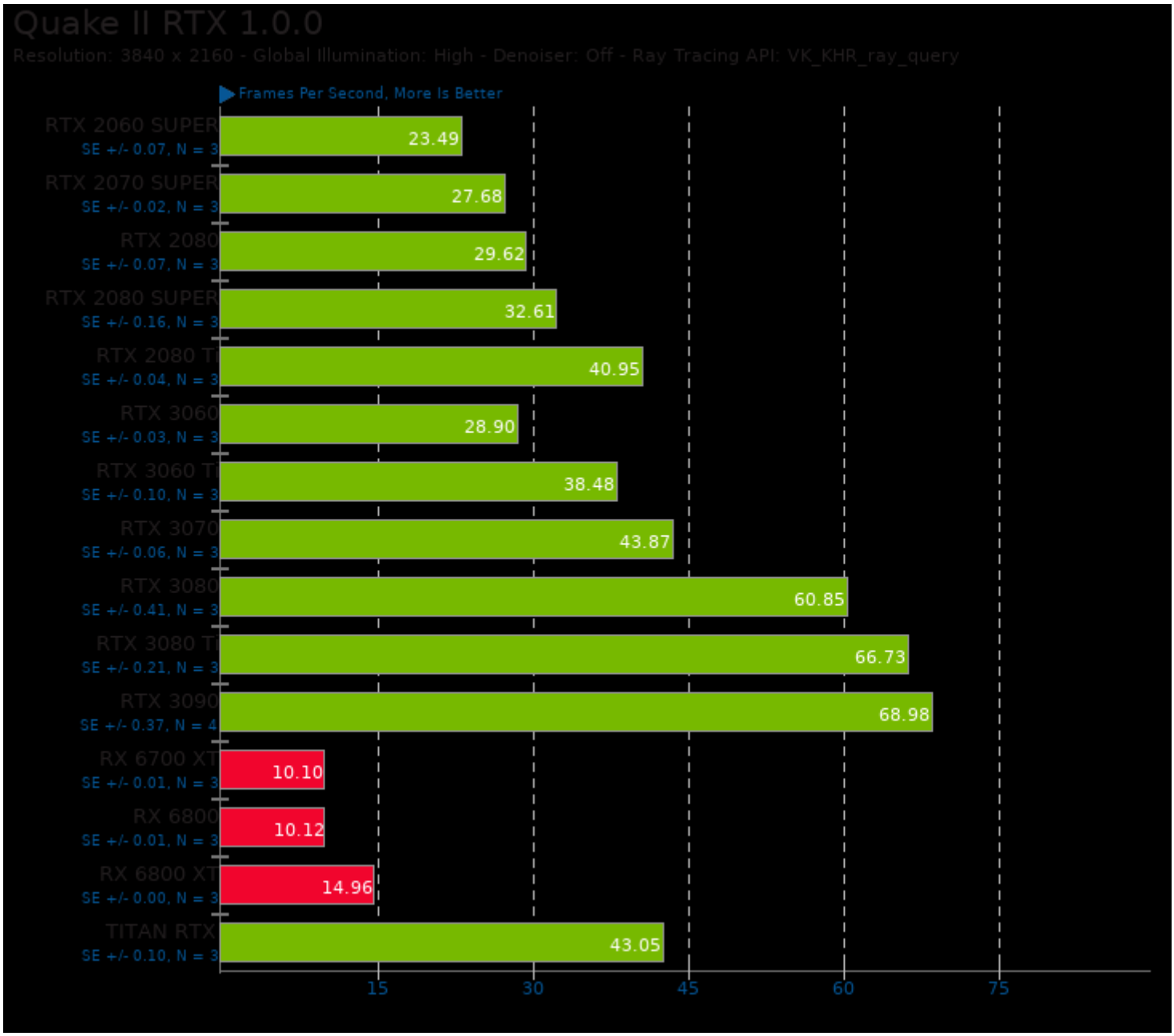
Vulkan Ray-Tracing GPUs

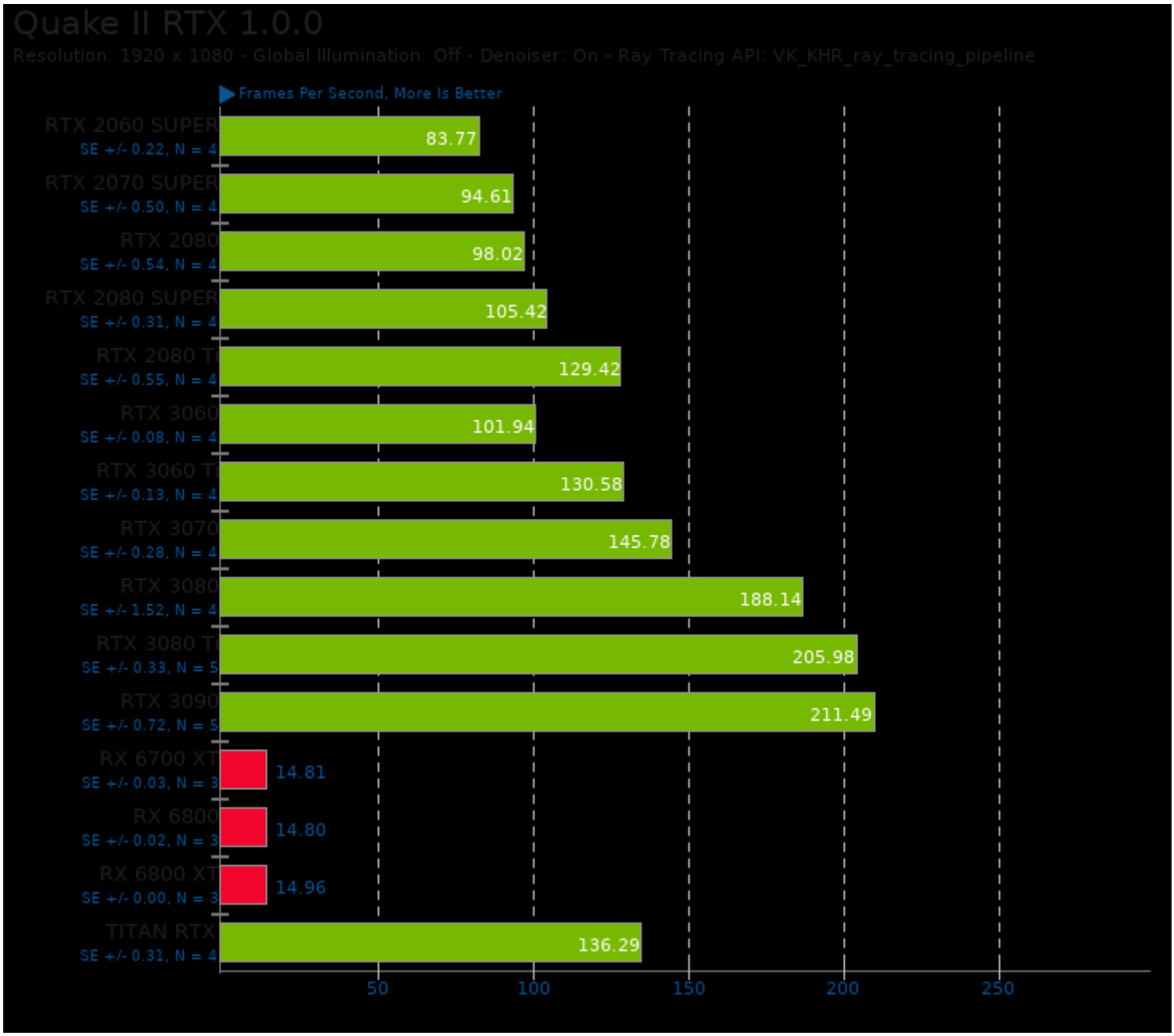



Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.36, N = 4
83.09
RTX 2070 SUPER
SE +/- 0.18, N = 4
96.48
RTX 2080
SE +/- 0.06, N = 4
102.72
RTX 2080 SUPER
SE +/- 0.15, N = 4
110.83
RTX 2080 T
SE +/- 1.18, N = 4
132.67
RTX 3060
SE +/- 0.65, N = 4
102.51
RTX 3060 T
SE +/- 0.29, N = 4
133.49
RTX 3070
SE +/- 0.21, N = 5
148.19
RTX 3080
SE +/- 0.98, N = 5
192.59
RTX 3080 T
SE +/- 1.44, N = 5
207.32
RTX 3090
SE +/- 2.16, N = 5
214.08
RX 6700 XT
SE +/- 0.02, N = 3
10.11
RX 6800
SE +/- 0.01, N = 3
10.12
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 1.48, N = 4
140.88
50
100
150
200
250

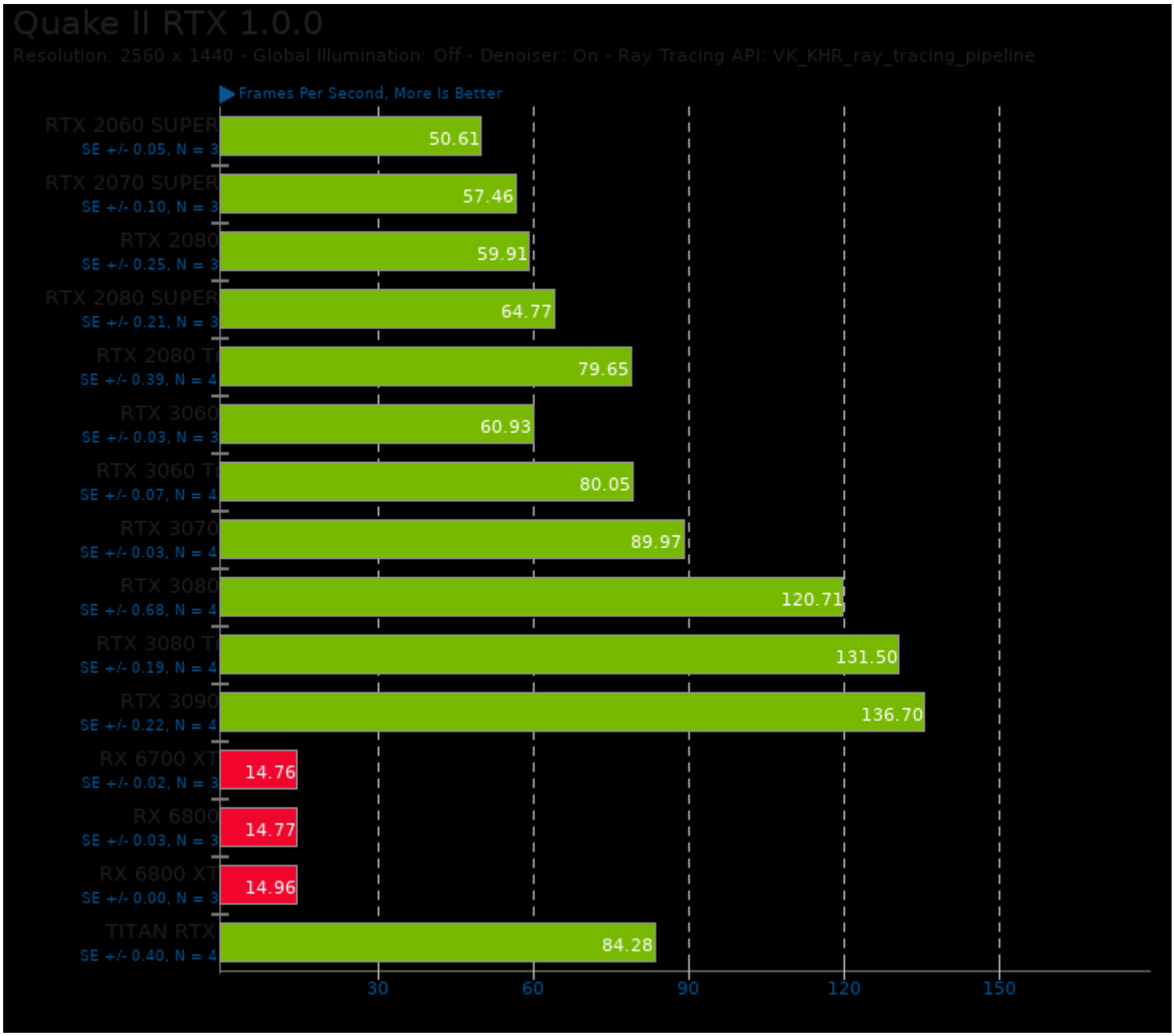

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.04, N = 3
50.69
RTX 2070 SUPER
SE +/- 0.22, N = 3
58.83
RTX 2080
SE +/- 0.05, N = 3
62.98
RTX 2080 SUPER
SE +/- 0.17, N = 4
68.81
RTX 2080 Ti
SE +/- 0.09, N = 4
85.24
RTX 3060
SE +/- 0.14, N = 3
62.24
RTX 3060 Ti
SE +/- 0.07, N = 4
81.88
RTX 3070
SE +/- 0.47, N = 4
91.43
RTX 3080
SE +/- 0.30, N = 4
124.15
RTX 3080 Ti
SE +/- 0.66, N = 4
134.24
RTX 3090
SE +/- 0.86, N = 5
139.41
RX 6700 XT
SE +/- 0.03, N = 3
10.13
RX 6800
SE +/- 0.00, N = 3
10.08
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 0.24, N = 4
89.32
30
60
90
120
150

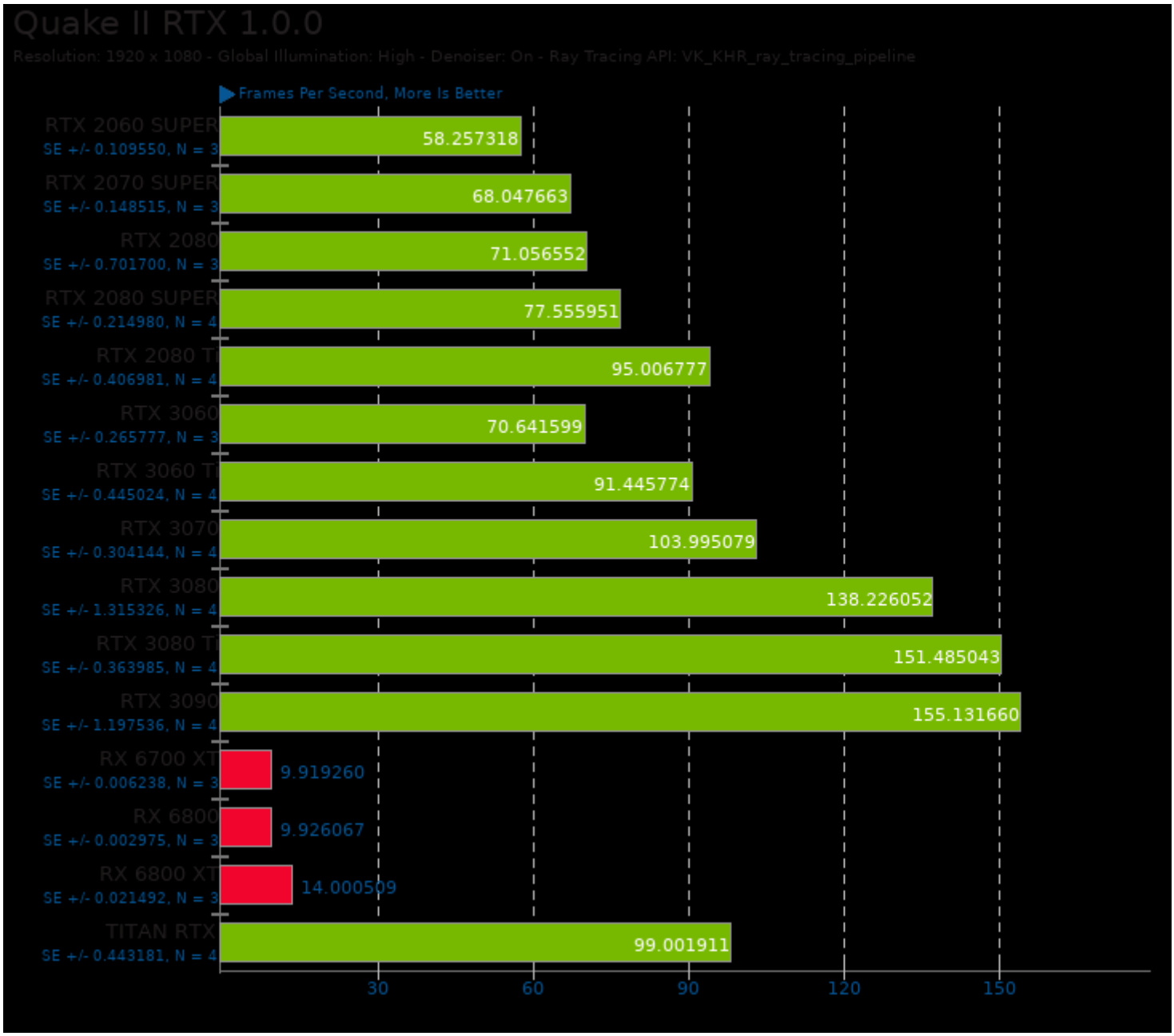
Vulkan Ray-Tracing GPUs



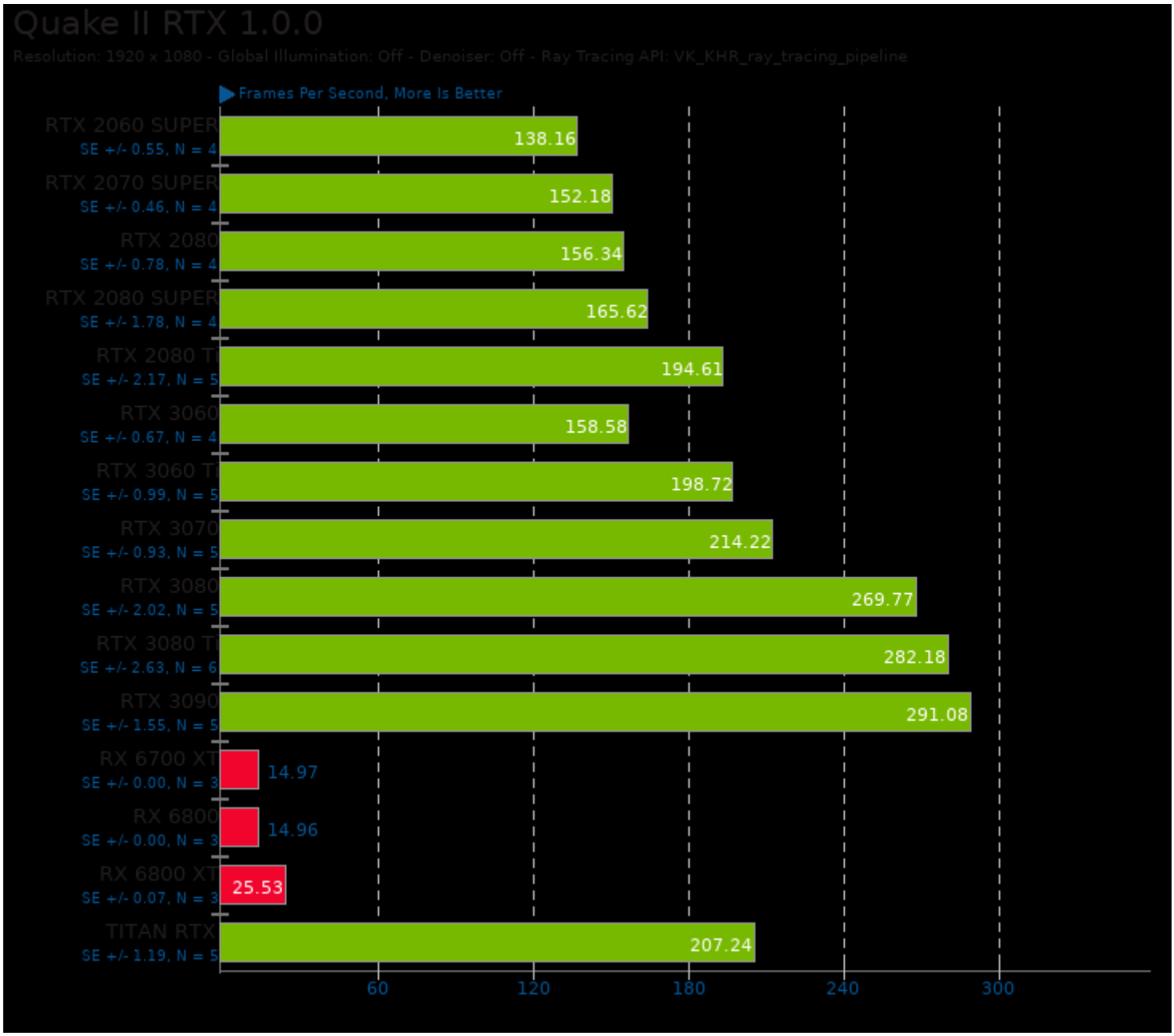

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.22, N = 4
83.77
RTX 2070 SUPER
SE +/- 0.50, N = 4
94.61
RTX 2080
SE +/- 0.54, N = 4
98.02
RTX 2080 SUPER
SE +/- 0.31, N = 4
105.42
RTX 2080 Ti
SE +/- 0.55, N = 4
129.42
RTX 3060
SE +/- 0.08, N = 4
101.94
RTX 3060 Ti
SE +/- 0.13, N = 4
130.58
RTX 3070
SE +/- 0.28, N = 4
145.78
RTX 3080
SE +/- 1.52, N = 4
188.14
RTX 3080 Ti
SE +/- 0.33, N = 5
205.98
RTX 3090
SE +/- 0.72, N = 5
211.49
RX 6700 XT
SE +/- 0.03, N = 3
14.81
RX 6800
SE +/- 0.02, N = 3
14.80
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 0.31, N = 4
136.29
50
100
150
200
250

Vulkan Ray-Tracing GPUs

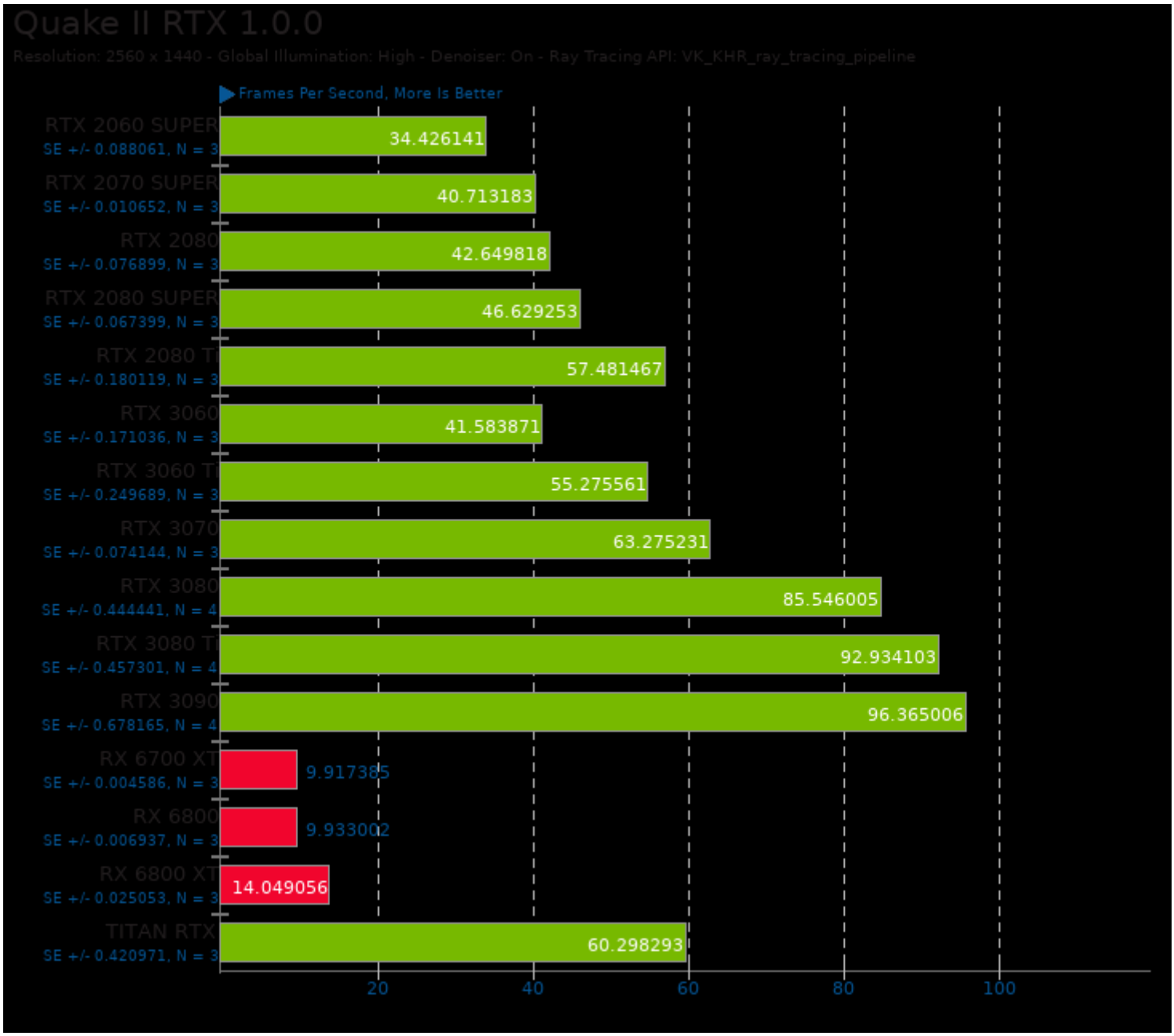


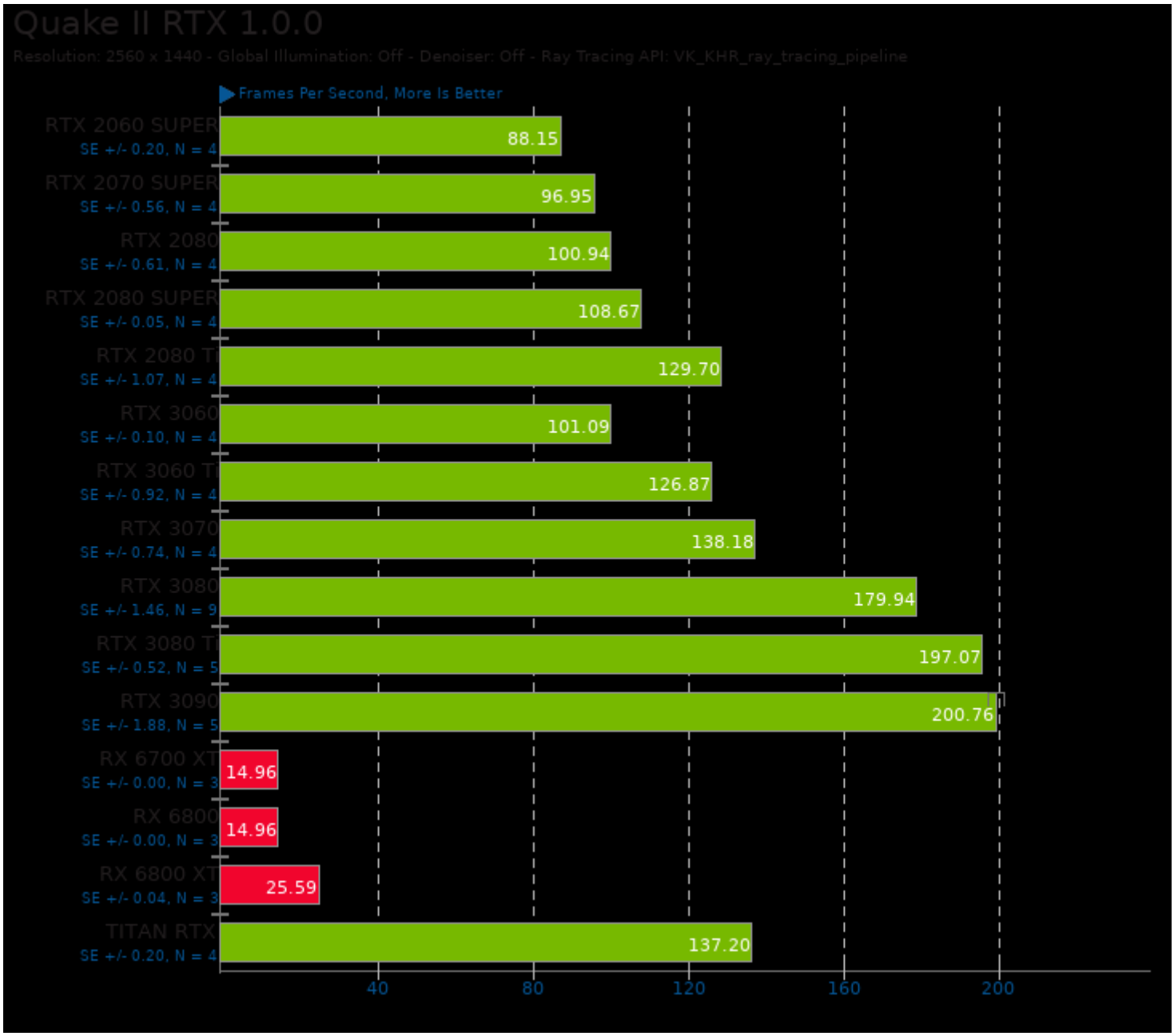

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.109550, N = 3
58.257318
RTX 2070 SUPER
SE +/- 0.148515, N = 3
68.047663
RTX 2080
SE +/- 0.701700, N = 3
71.056552
RTX 2080 SUPER
SE +/- 0.214980, N = 4
77.555951
RTX 2080 Ti
SE +/- 0.406981, N = 4
95.006777
RTX 3060
SE +/- 0.265777, N = 3
70.641599
RTX 3060 Ti
SE +/- 0.445024, N = 4
91.445774
RTX 3070
SE +/- 0.304144, N = 4
103.995079
RTX 3080
SE +/- 1.315326, N = 4
138.226052
RTX 3080 Ti
SE +/- 0.363985, N = 4
151.485043
RTX 3090
SE +/- 1.197536, N = 4
155.131660
RX 6700 XT
SE +/- 0.006238, N = 3
9.919260
RX 6800
SE +/- 0.002975, N = 3
9.926067
RX 6800 XT
SE +/- 0.021492, N = 3
14.000509
TITAN RTX
SE +/- 0.443181, N = 4
99.001911
30
60
90
120
150

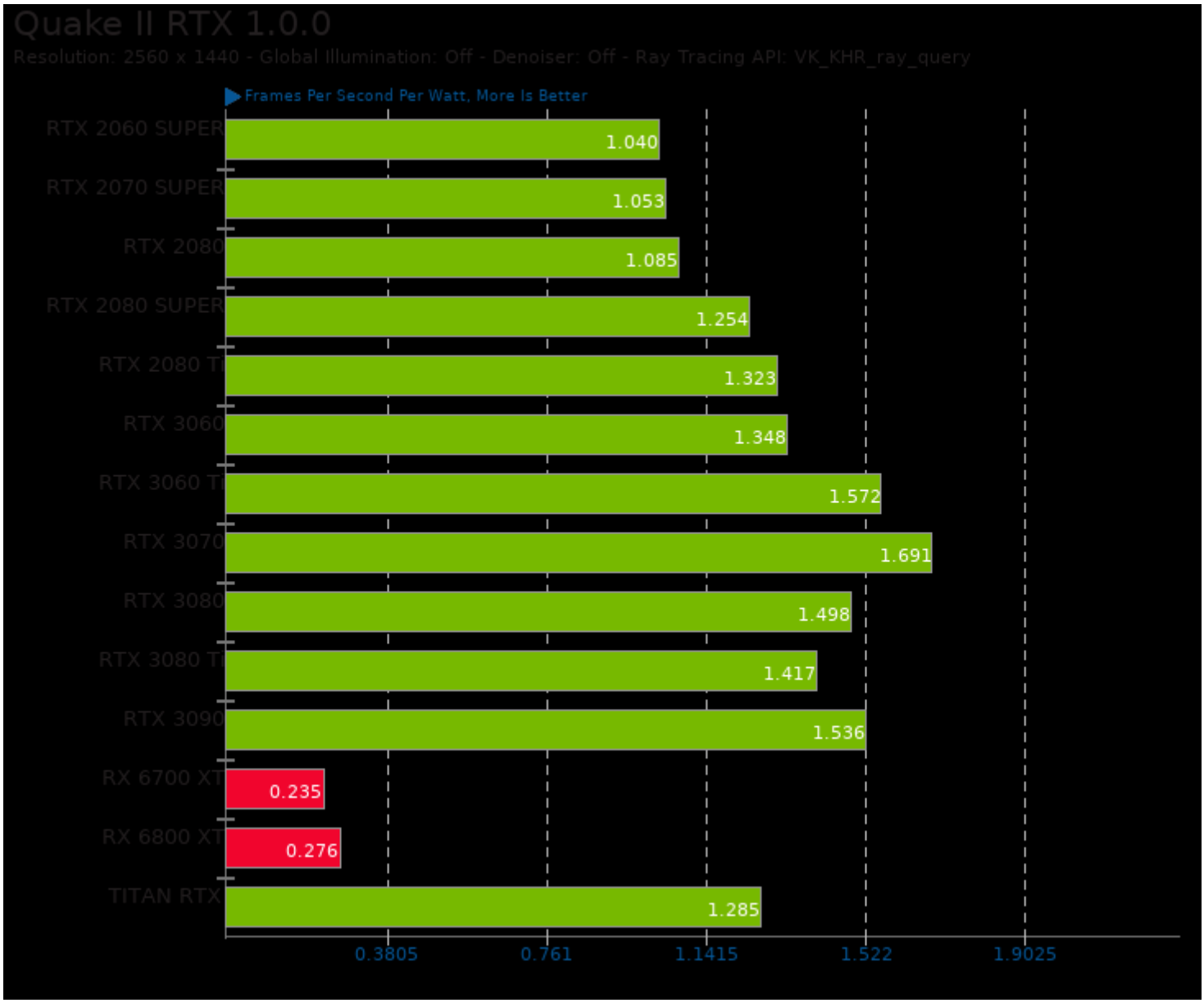
Vulkan Ray-Tracing GPUs



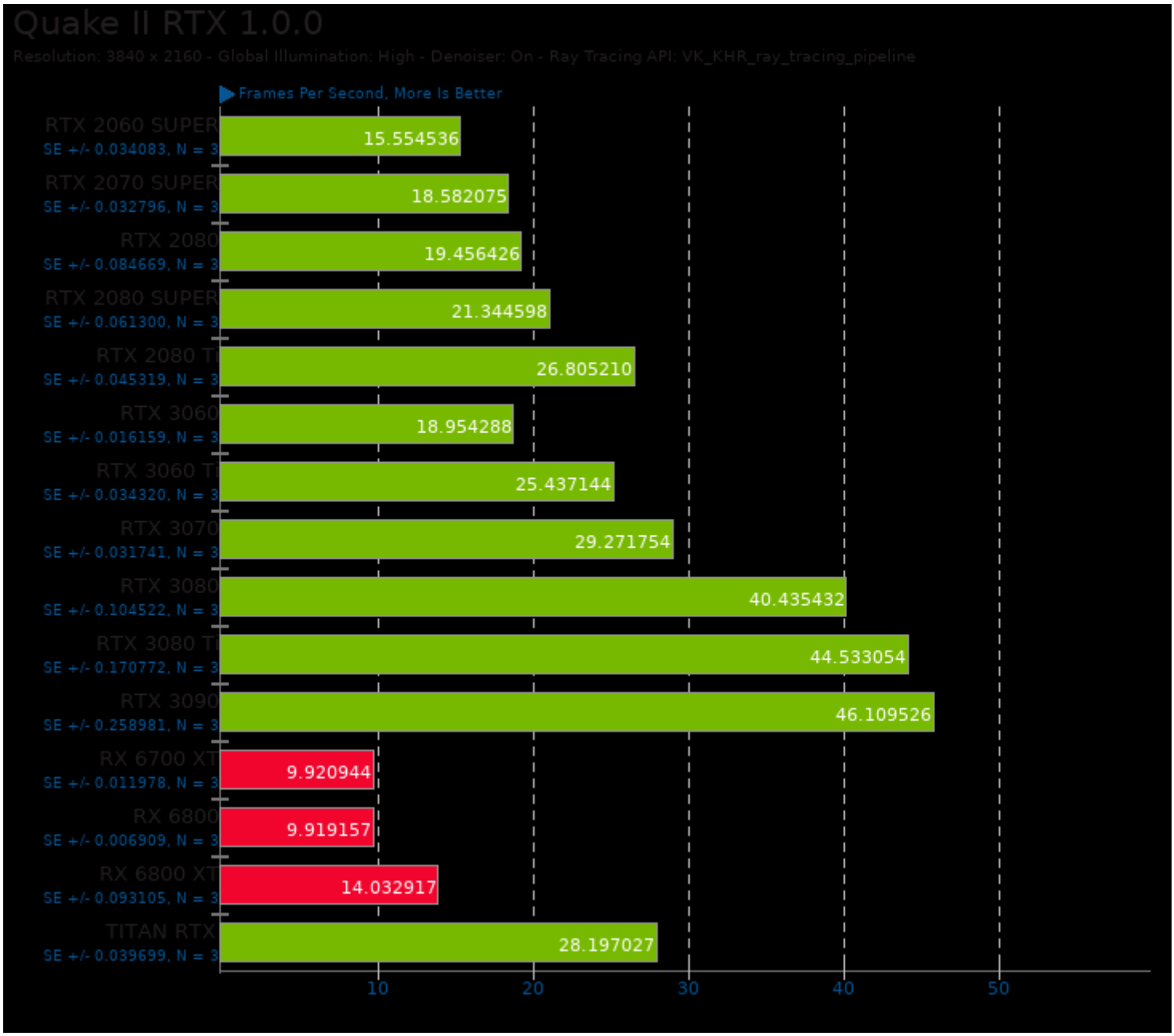
Vulkan Ray-Tracing GPUs

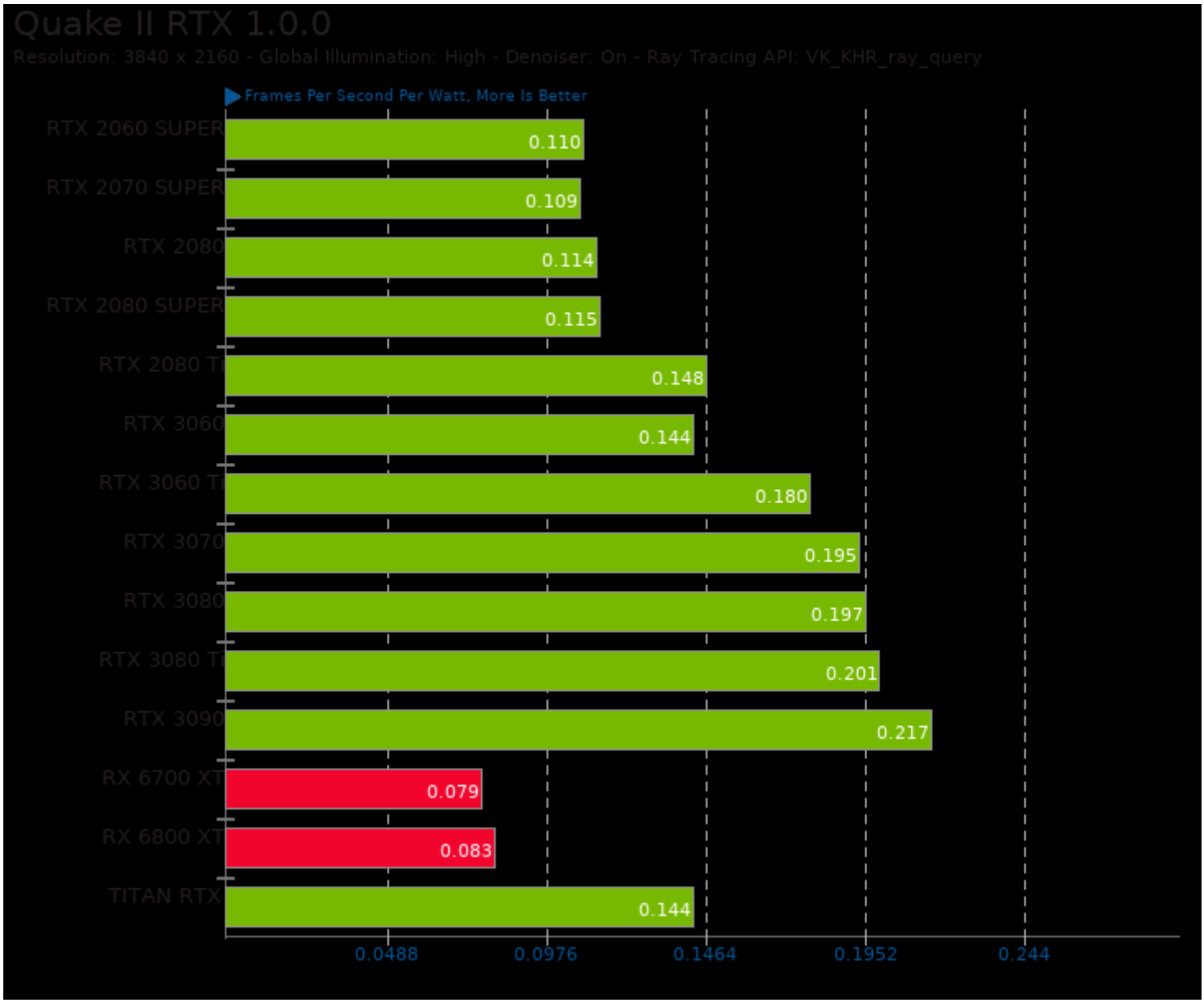



Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.20, N = 4
88.15
RTX 2070 SUPER
SE +/- 0.56, N = 4
96.95
RTX 2080
SE +/- 0.61, N = 4
100.94
RTX 2080 SUPER
SE +/- 0.05, N = 4
108.67
RTX 2080 Ti
SE +/- 1.07, N = 4
129.70
RTX 3060
SE +/- 0.10, N = 4
101.09
RTX 3060 Ti
SE +/- 0.92, N = 4
126.87
RTX 3070
SE +/- 0.74, N = 4
138.18
RTX 3080
SE +/- 1.46, N = 9
179.94
RTX 3080 Ti
SE +/- 0.52, N = 5
197.07
RTX 3090
SE +/- 1.88, N = 5
200.76
RX 6700 XT
SE +/- 0.00, N = 3
14.96
RX 6800
SE +/- 0.00, N = 3
14.96
RX 6800 XT
SE +/- 0.04, N = 3
25.59
TITAN RTX
SE +/- 0.20, N = 4
137.20
40
80
120
160
200

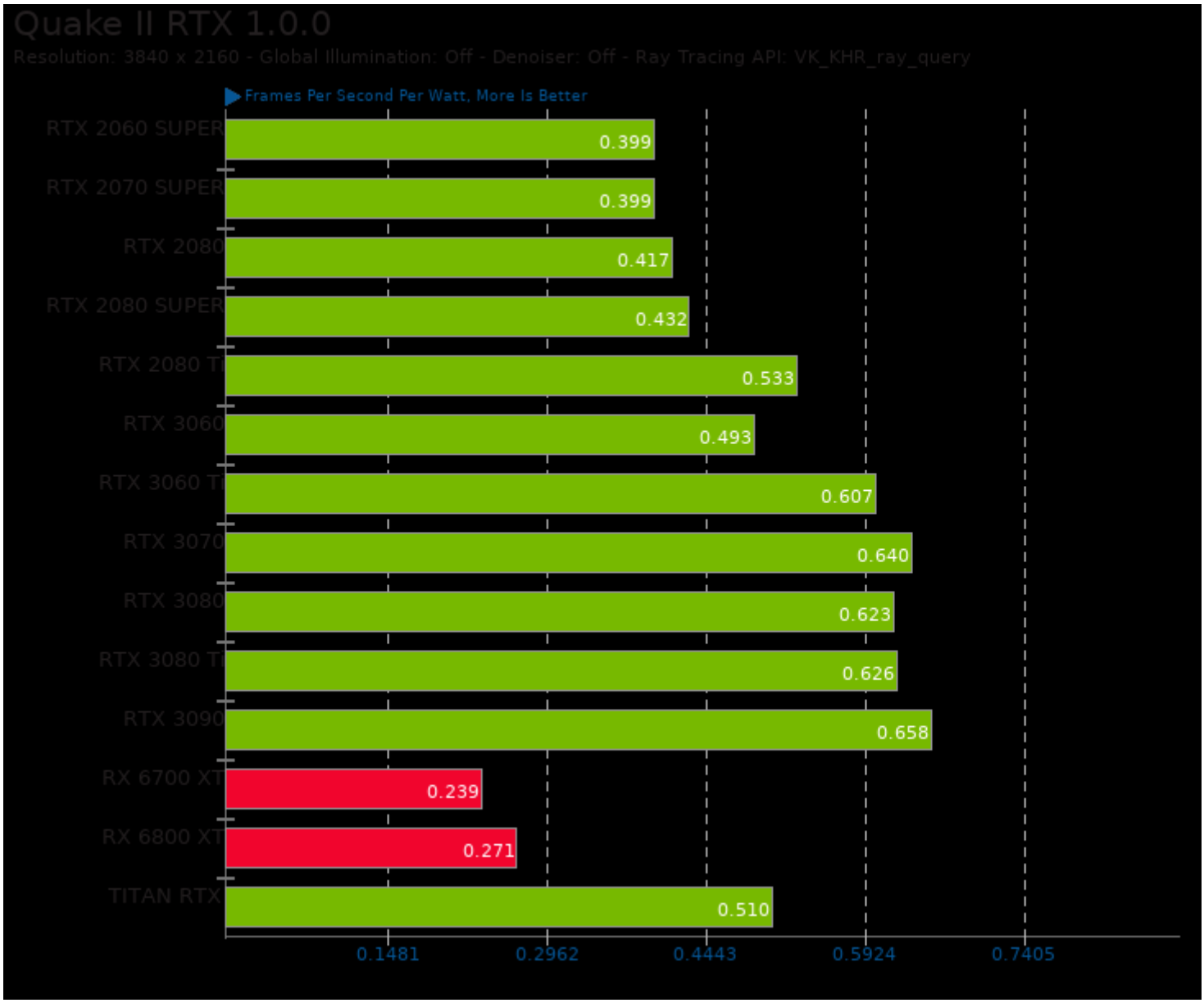

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
1.040
RTX 2070 SUPER
1.053
RTX 2080
1.085
RTX 2080 SUPER
1.254
RTX 2080 Ti
1.323
RTX 3060
1.348
RTX 3060 Ti
1.572
RTX 3070
1.691
RTX 3080
1.498
RTX 3080 Ti
1.417
RTX 3090
1.536
RX 6700 XT
0.235
RX 6800 XT
0.276
TITAN RTX
1.285
0.3805
0.761
1.1415
1.522
1.9025

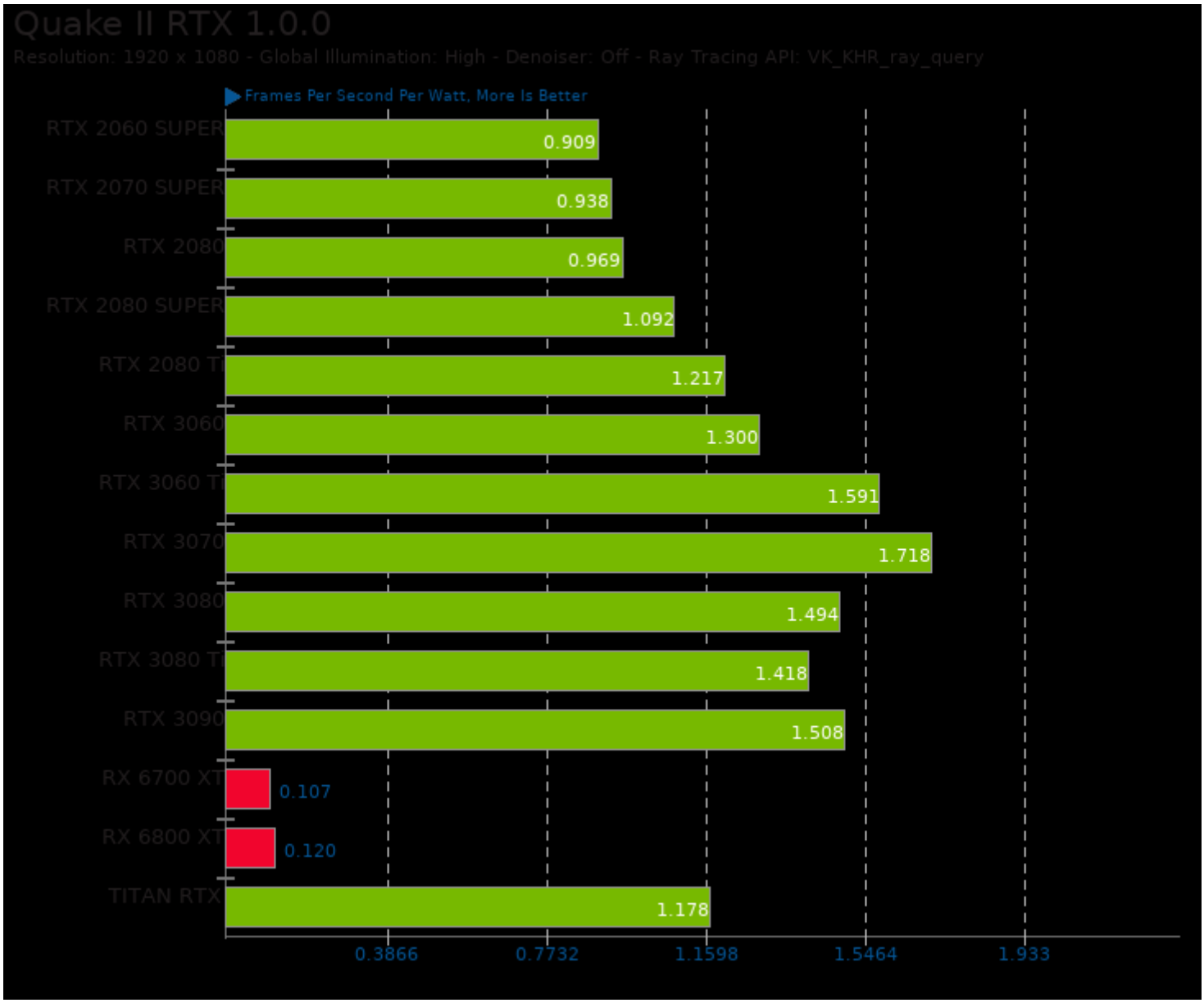
Vulkan Ray-Tracing GPUs



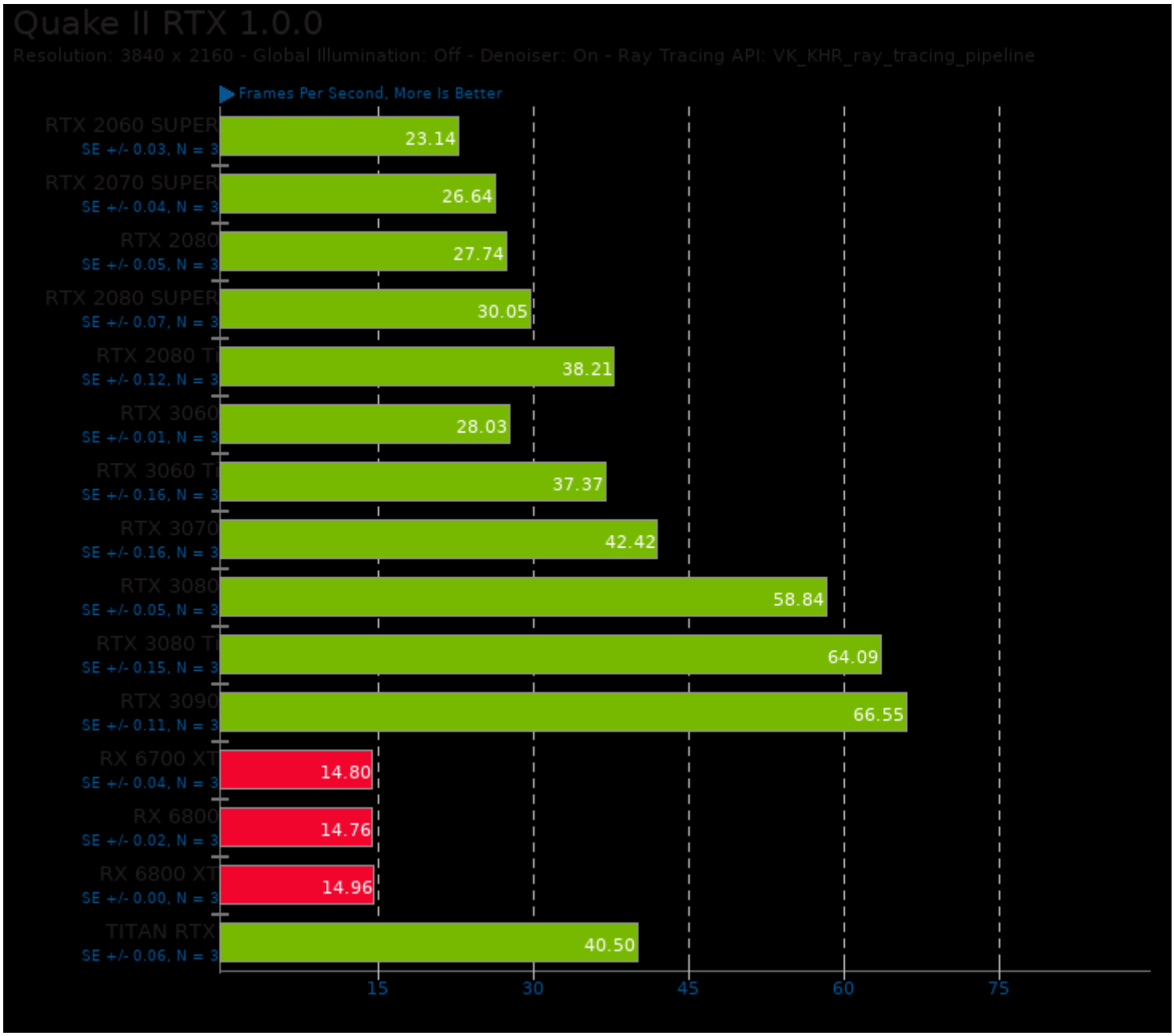

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.110
RTX 2070 SUPER
0.109
RTX 2080
0.114
RTX 2080 SUPER
0.115
RTX 2080 Ti
0.148
RTX 3060
0.144
RTX 3060 Ti
0.180
RTX 3070
0.195
RTX 3080
0.197
RTX 3080 Ti
0.201
RTX 3090
0.217
RX 6700 XT
0.079
RX 6800 XT
0.083
TITAN RTX
0.144
0.0488
0.0976
0.1464
0.1952
0.244

Vulkan Ray-Tracing GPUs

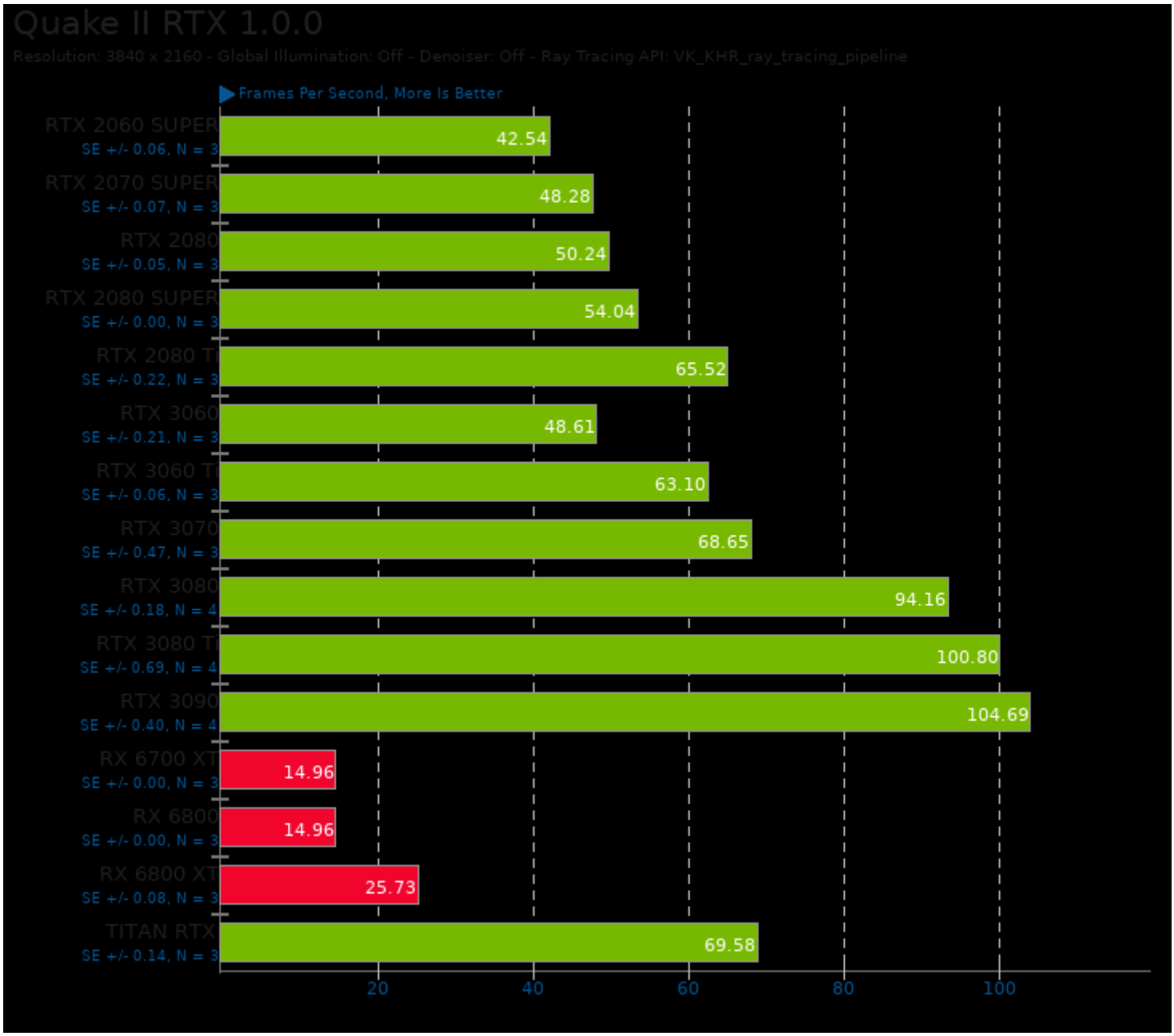


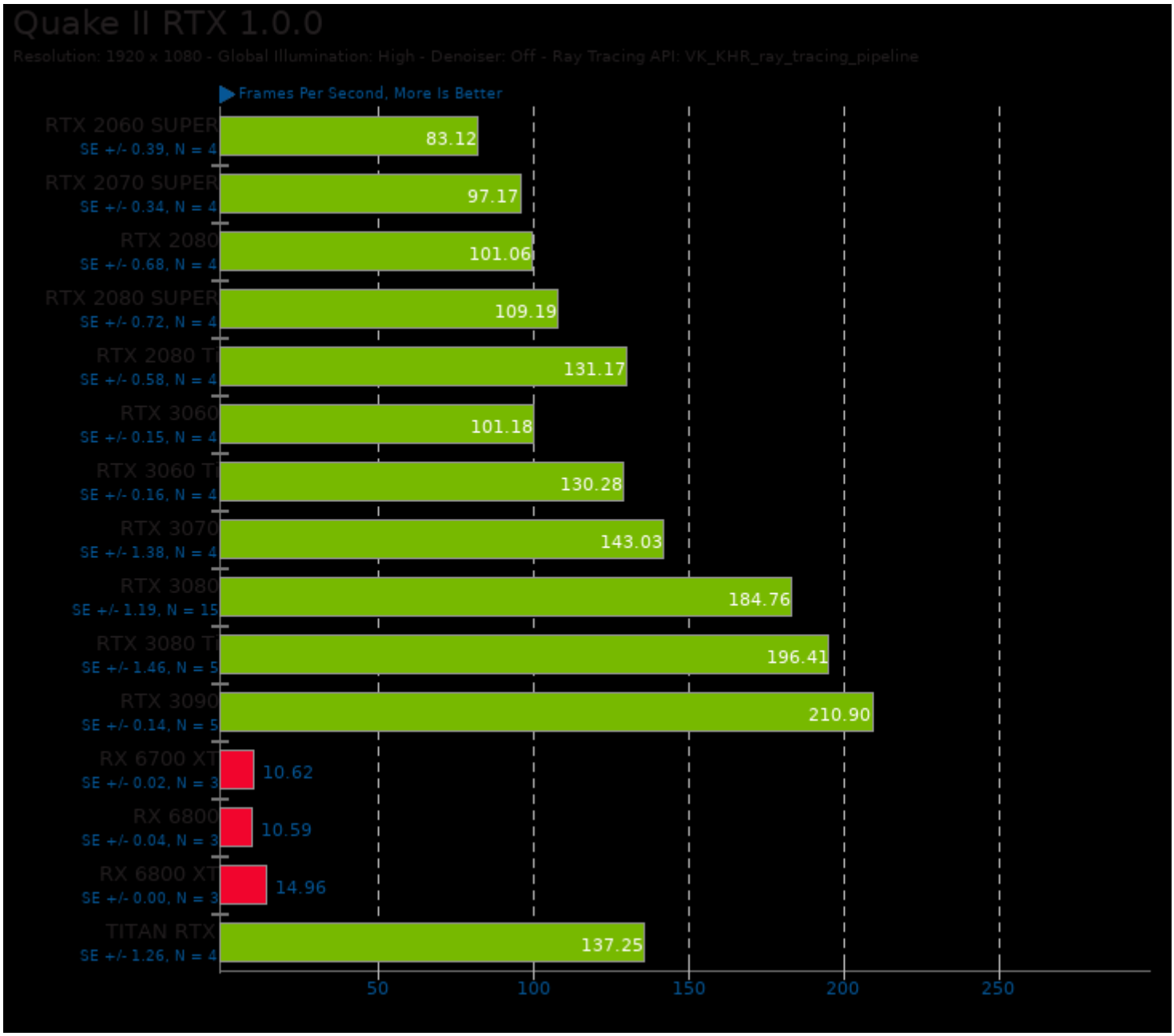

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.909
RTX 2070 SUPER
0.938
RTX 2080
0.969
RTX 2080 SUPER
1.092
RTX 2080 Ti
1.217
RTX 3060
1.300
RTX 3060 Ti
1.591
RTX 3070
1.718
RTX 3080
1.494
RTX 3080 Ti
1.418
RTX 3090
1.508
RX 6700 XT
0.107
RX 6800 XT
0.120
TITAN RTX
1.178
0.3866
0.7732
1.1598
1.5464
1.933

Vulkan Ray-Tracing GPUs

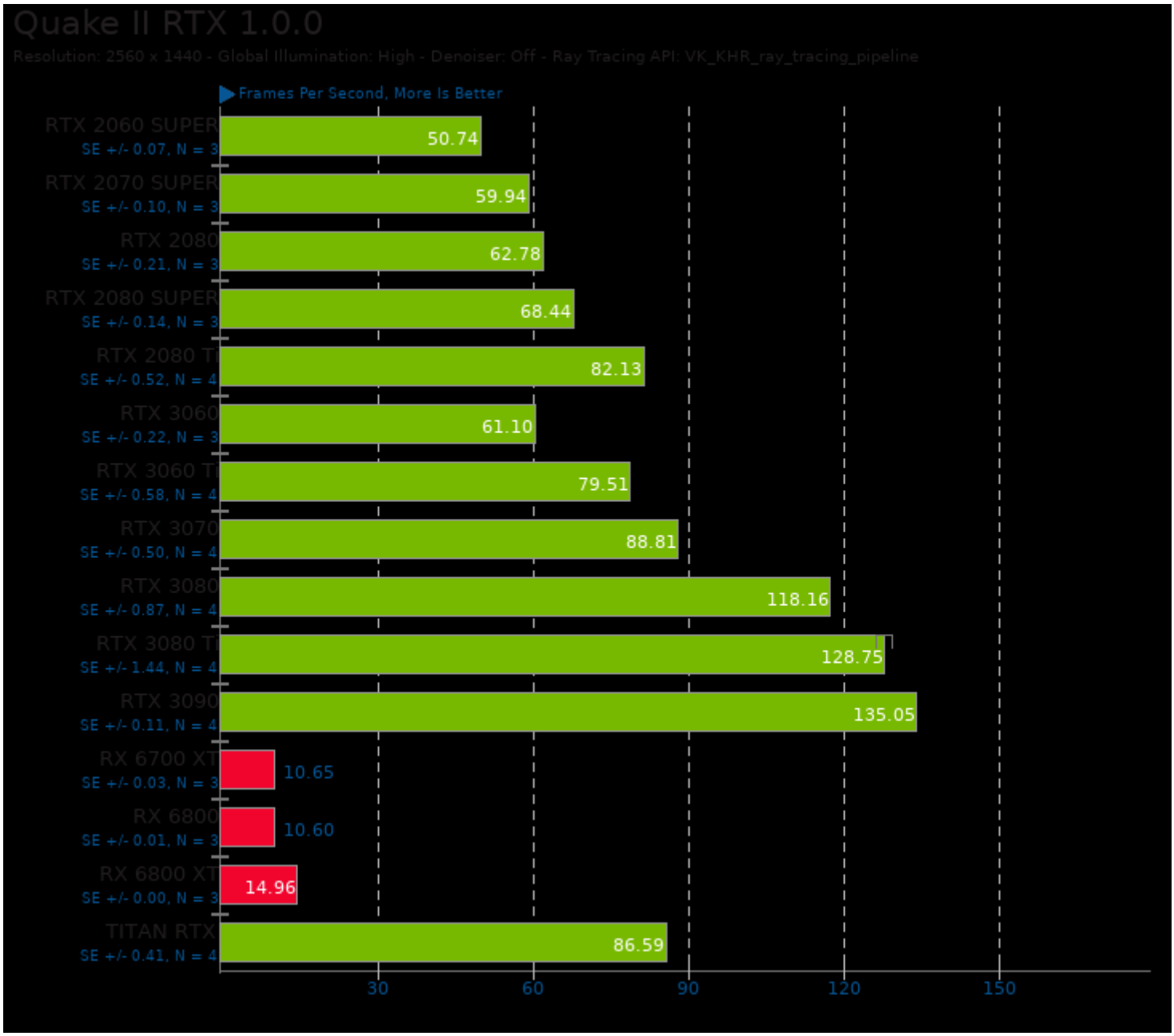


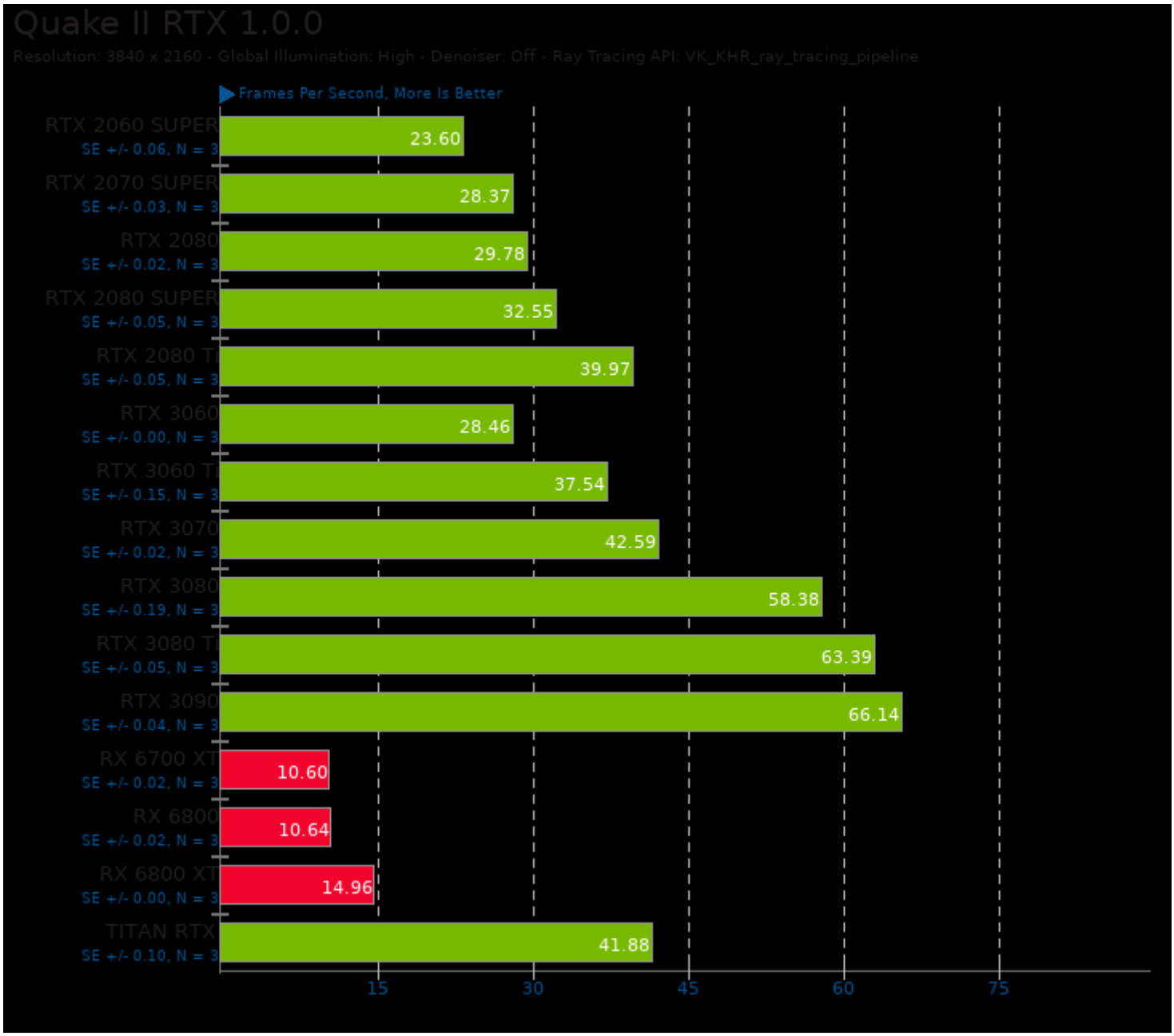
Vulkan Ray-Tracing GPUs

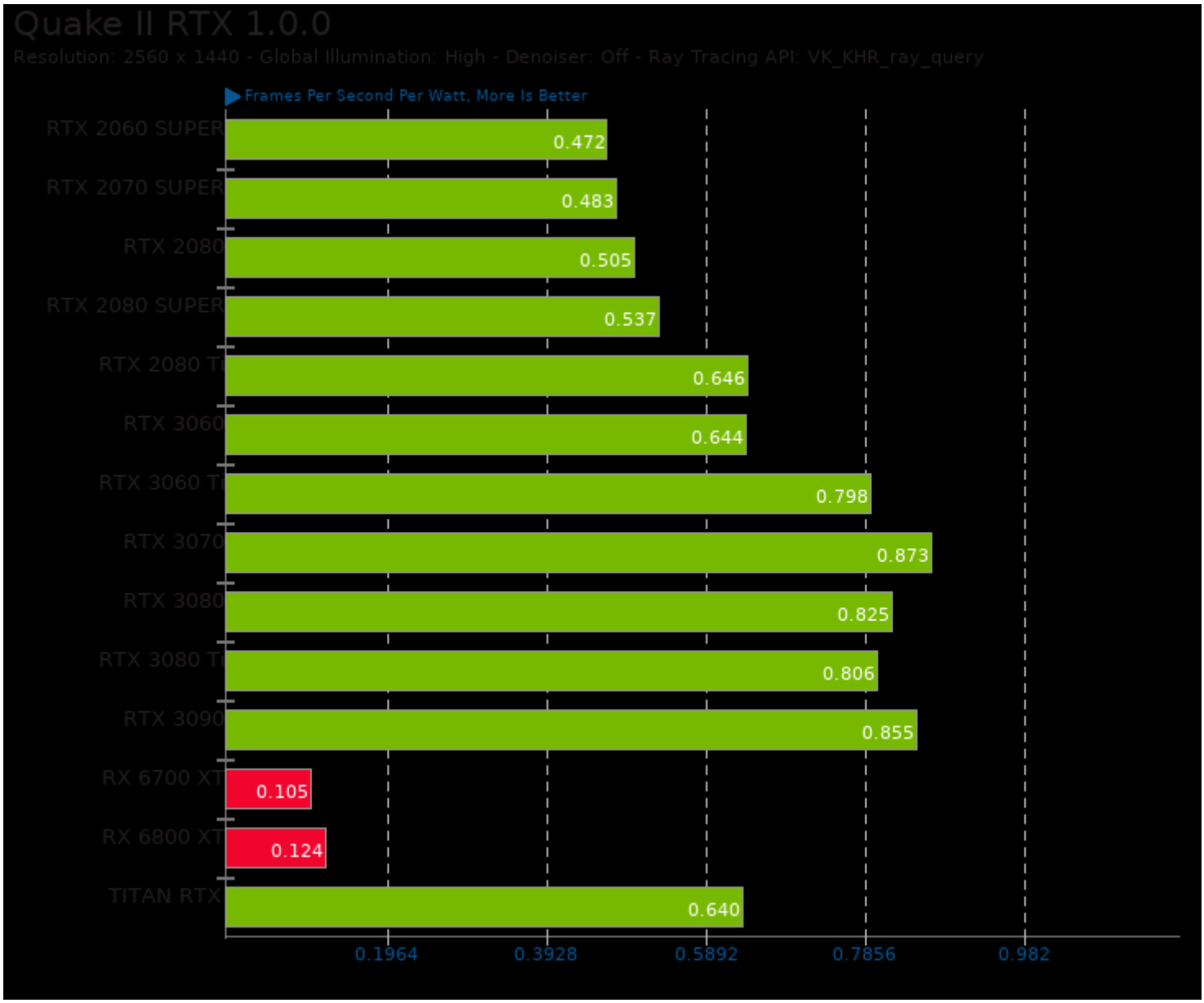


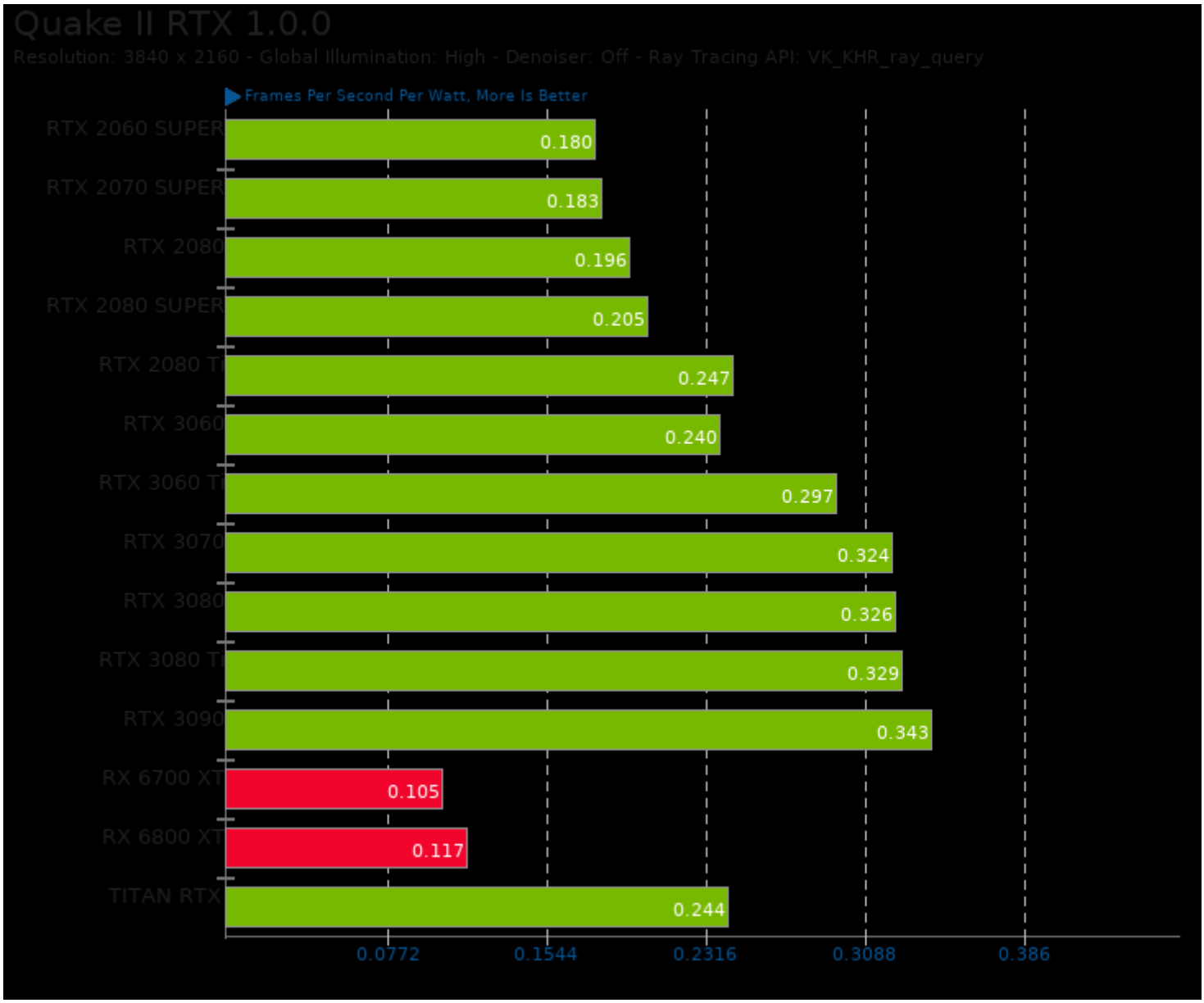

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.39, N = 4
83.12
RTX 2070 SUPER
SE +/- 0.34, N = 4
97.17
RTX 2080
SE +/- 0.68, N = 4
101.06
RTX 2080 SUPER
SE +/- 0.72, N = 4
109.19
RTX 2080 Ti
SE +/- 0.58, N = 4
131.17
RTX 3060
SE +/- 0.15, N = 4
101.18
RTX 3060 Ti
SE +/- 0.16, N = 4
130.28
RTX 3070
SE +/- 1.38, N = 4
143.03
RTX 3080
SE +/- 1.19, N = 15
184.76
RTX 3080 Ti
SE +/- 1.46, N = 5
196.41
RTX 3090
SE +/- 0.14, N = 5
210.90
RX 6700 XT
SE +/- 0.02, N = 3
10.62
RX 6800
SE +/- 0.04, N = 3
10.59
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 1.26, N = 4
137.25
50
100
150
200
250

Vulkan Ray-Tracing GPUs

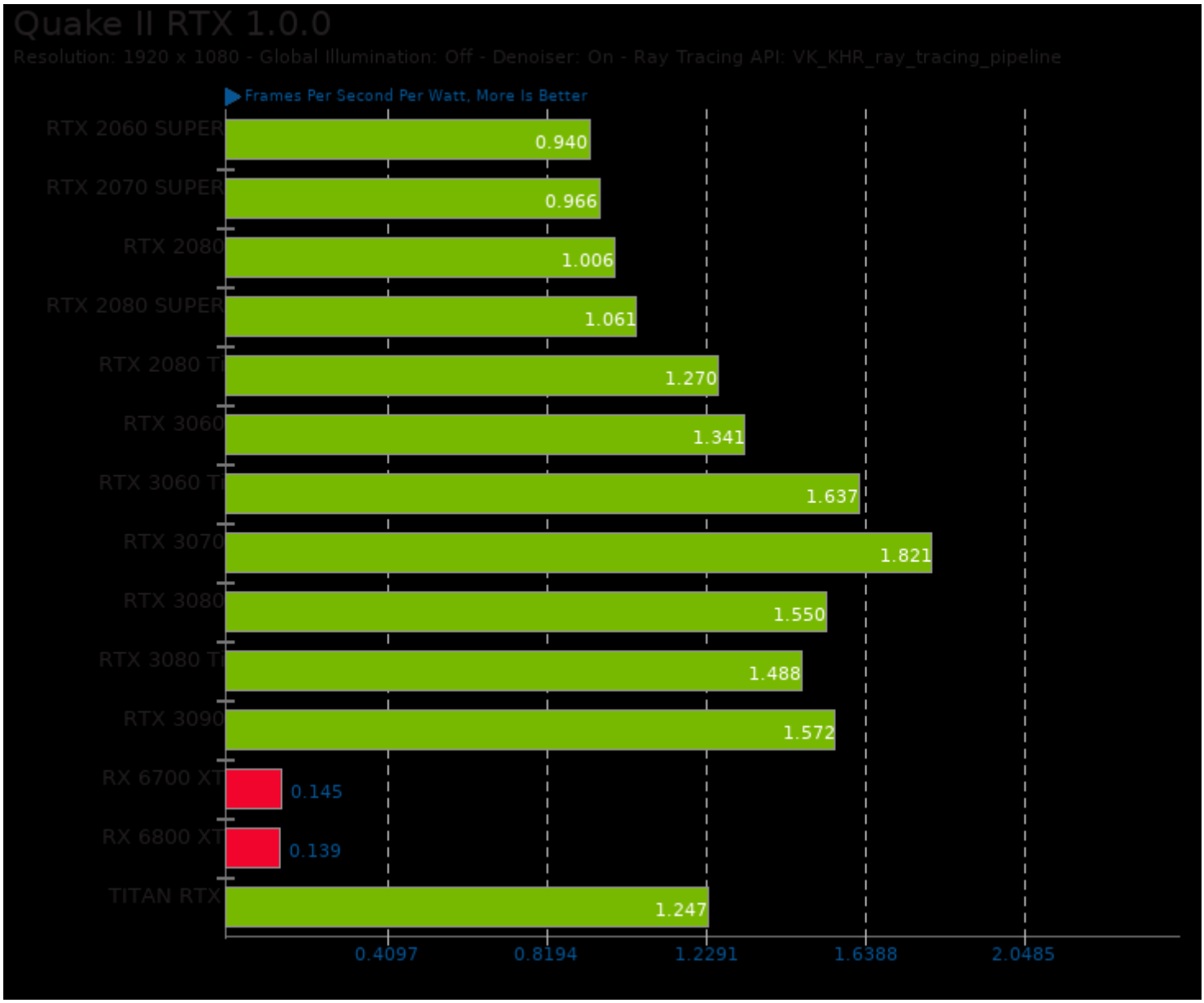


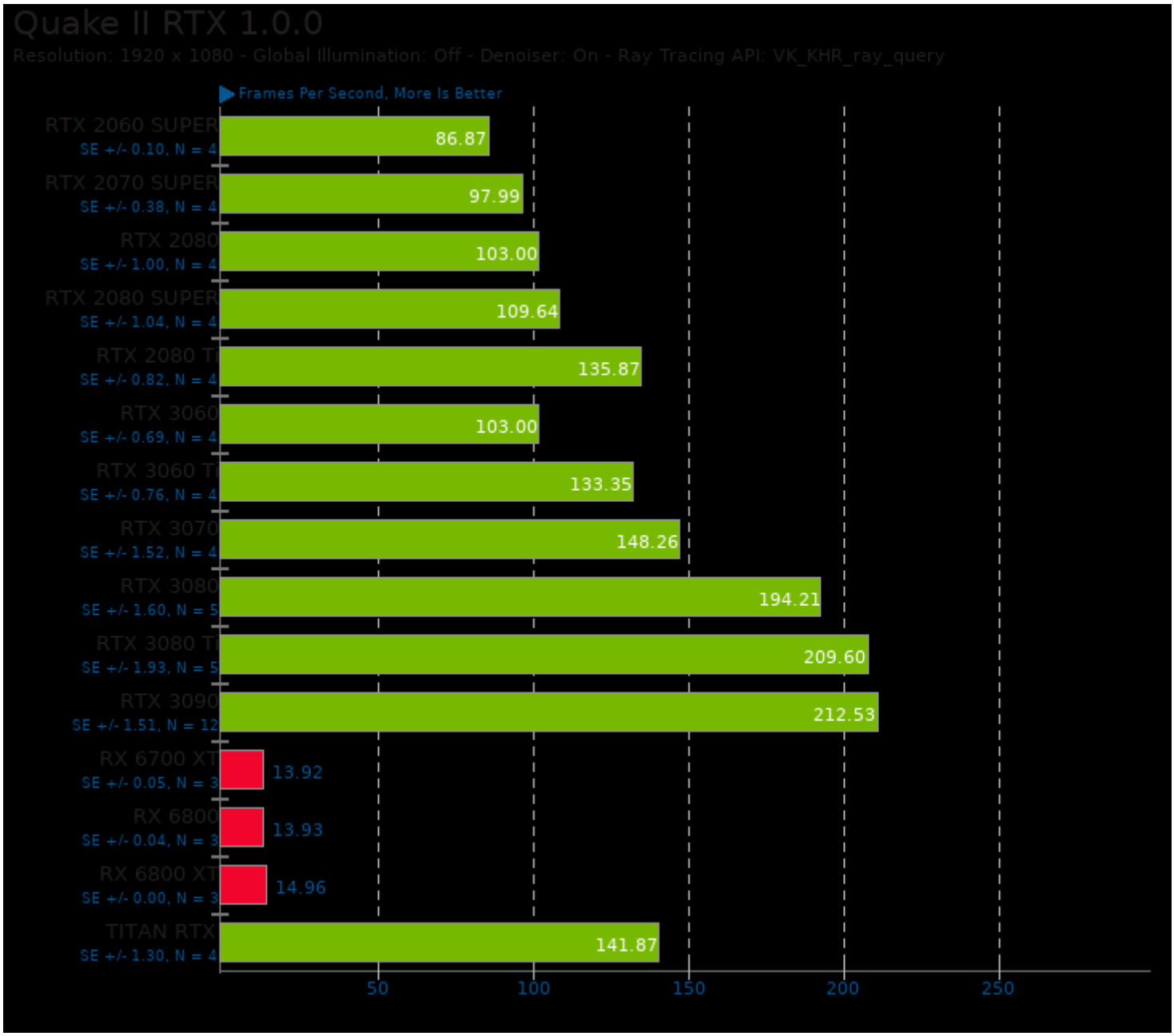

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.06, N = 3
23.60
RTX 2070 SUPER
SE +/- 0.03, N = 3
28.37
RTX 2080
SE +/- 0.02, N = 3
29.78
RTX 2080 SUPER
SE +/- 0.05, N = 3
32.55
RTX 2080 Ti
SE +/- 0.05, N = 3
39.97
RTX 3060
SE +/- 0.00, N = 3
28.46
RTX 3060 Ti
SE +/- 0.15, N = 3
37.54
RTX 3070
SE +/- 0.02, N = 3
42.59
RTX 3080
SE +/- 0.19, N = 3
58.38
RTX 3080 Ti
SE +/- 0.05, N = 3
63.39
RTX 3090
SE +/- 0.04, N = 3
66.14
RX 6700 XT
SE +/- 0.02, N = 3
10.60
RX 6800
SE +/- 0.02, N = 3
10.64
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 0.10, N = 3
41.88
15
30
45
60
75

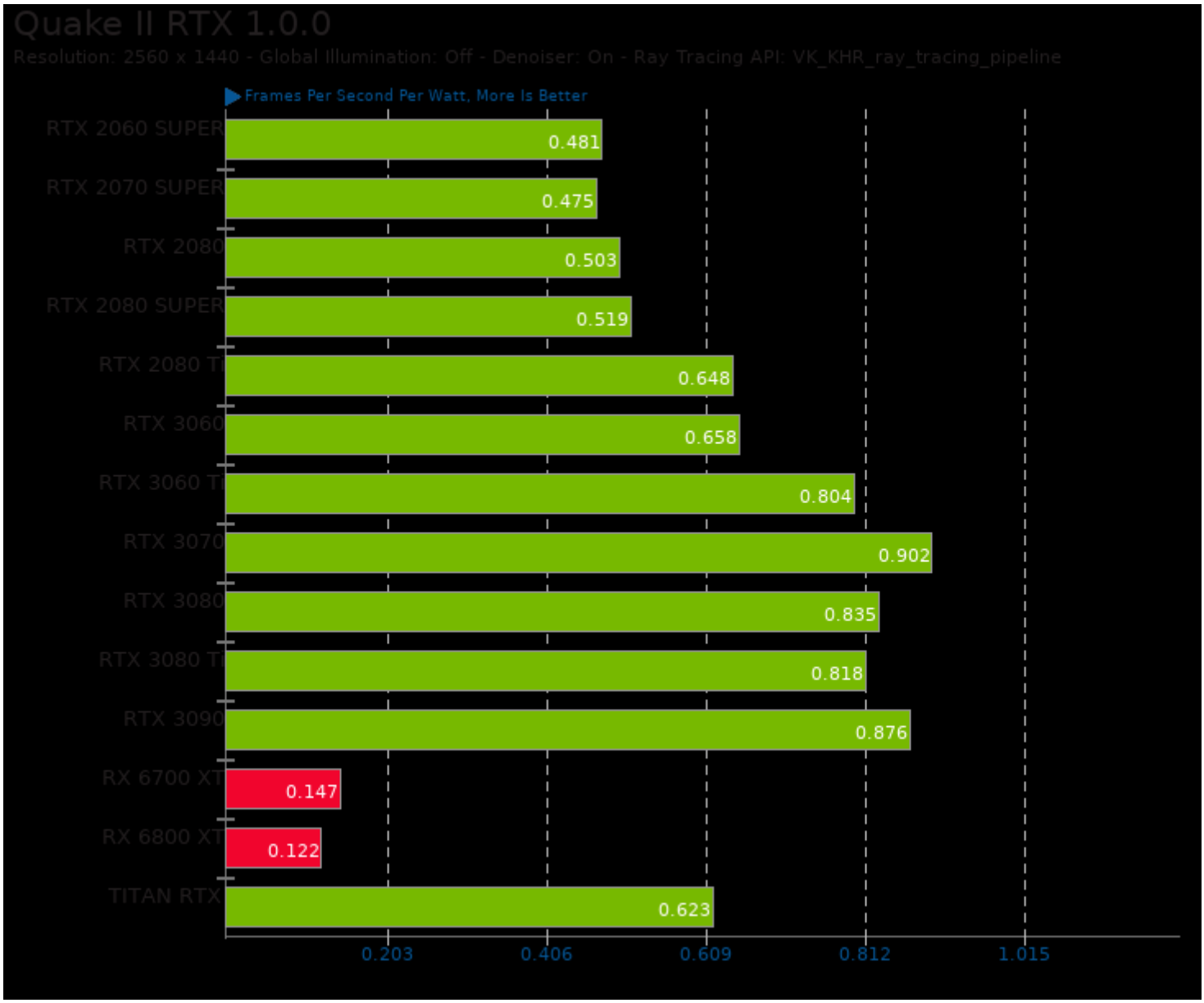

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.472
RTX 2070 SUPER
0.483
RTX 2080
0.505
RTX 2080 SUPER
0.537
RTX 2080 Ti
0.646
RTX 3060
0.644
RTX 3060 Ti
0.798
RTX 3070
0.873
RTX 3080
0.825
RTX 3080 Ti
0.806
RTX 3090
0.855
RX 6700 XT
0.105
RX 6800 XT
0.124
TITAN RTX
0.640
0.1964
0.3928
0.5892
0.7856
0.982


Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_query
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.180
RTX 2070 SUPER
0.183
RTX 2080
0.196
RTX 2080 SUPER
0.205
RTX 2080 Ti
0.247
RTX 3060
0.240
RTX 3060 Ti
0.297
RTX 3070
0.324
RTX 3080
0.326
RTX 3080 Ti
0.329
RTX 3090
0.343
RX 6700 XT
0.105
RX 6800 XT
0.117
TITAN RTX
0.244
0.0772
0.1544
0.2316
0.3088
0.386

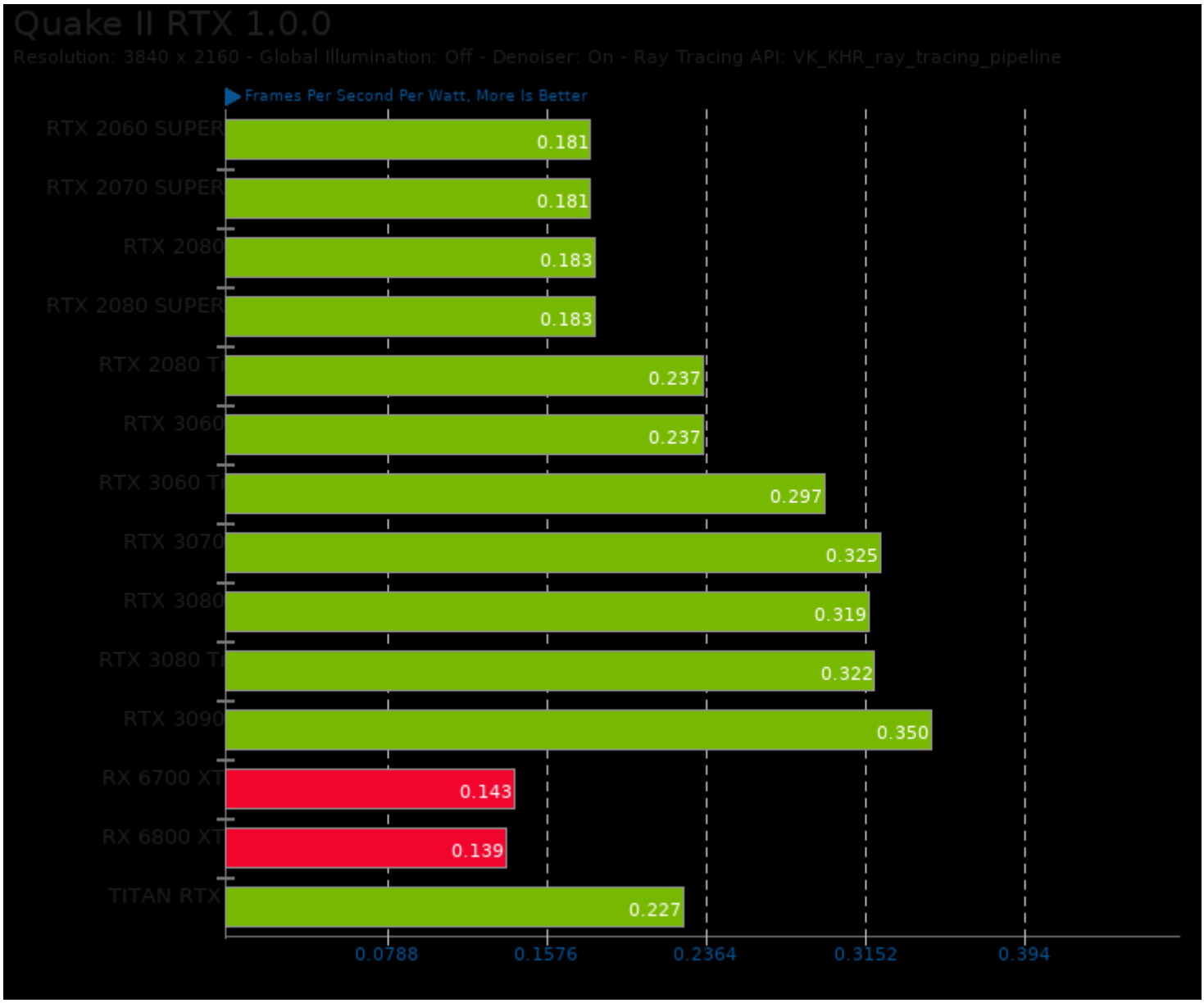
Vulkan Ray-Tracing GPUs



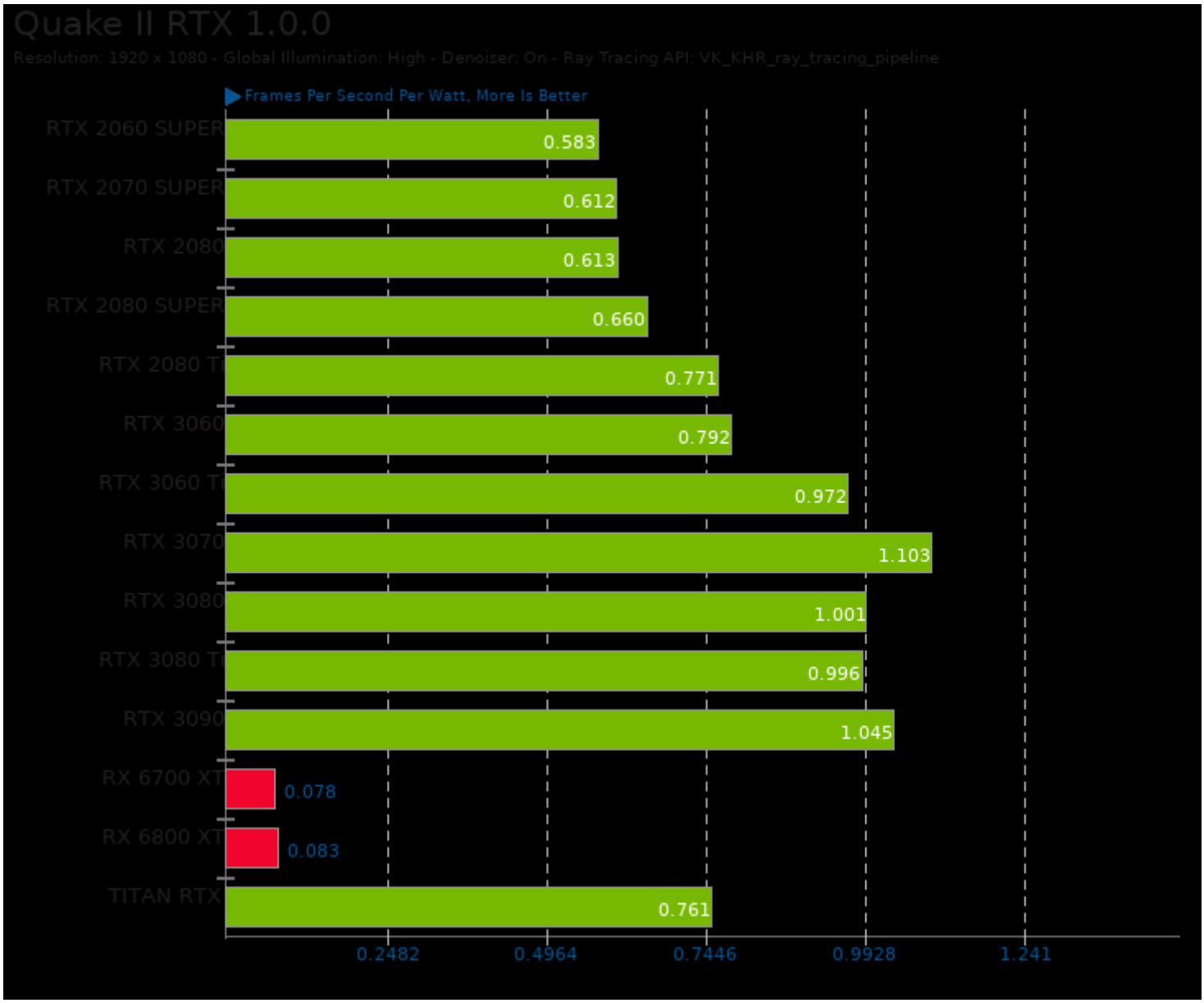

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_query
Frames Per Second, More Is Better
RTX 2060 SUPER
SE +/- 0.10, N = 4
86.87
RTX 2070 SUPER
SE +/- 0.38, N = 4
97.99
RTX 2080
SE +/- 1.00, N = 4
103.00
RTX 2080 SUPER
SE +/- 1.04, N = 4
109.64
RTX 2080 Ti
SE +/- 0.82, N = 4
135.87
RTX 3060
SE +/- 0.69, N = 4
103.00
RTX 3060 Ti
SE +/- 0.76, N = 4
133.35
RTX 3070
SE +/- 1.52, N = 4
148.26
RTX 3080
SE +/- 1.60, N = 5
194.21
RTX 3080 Ti
SE +/- 1.93, N = 5
209.60
RTX 3090
SE +/- 1.51, N = 12
212.53
RX 6700 XT
SE +/- 0.05, N = 3
13.92
RX 6800
SE +/- 0.04, N = 3
13.93
RX 6800 XT
SE +/- 0.00, N = 3
14.96
TITAN RTX
SE +/- 1.30, N = 4
141.87
50
100
150
200
250

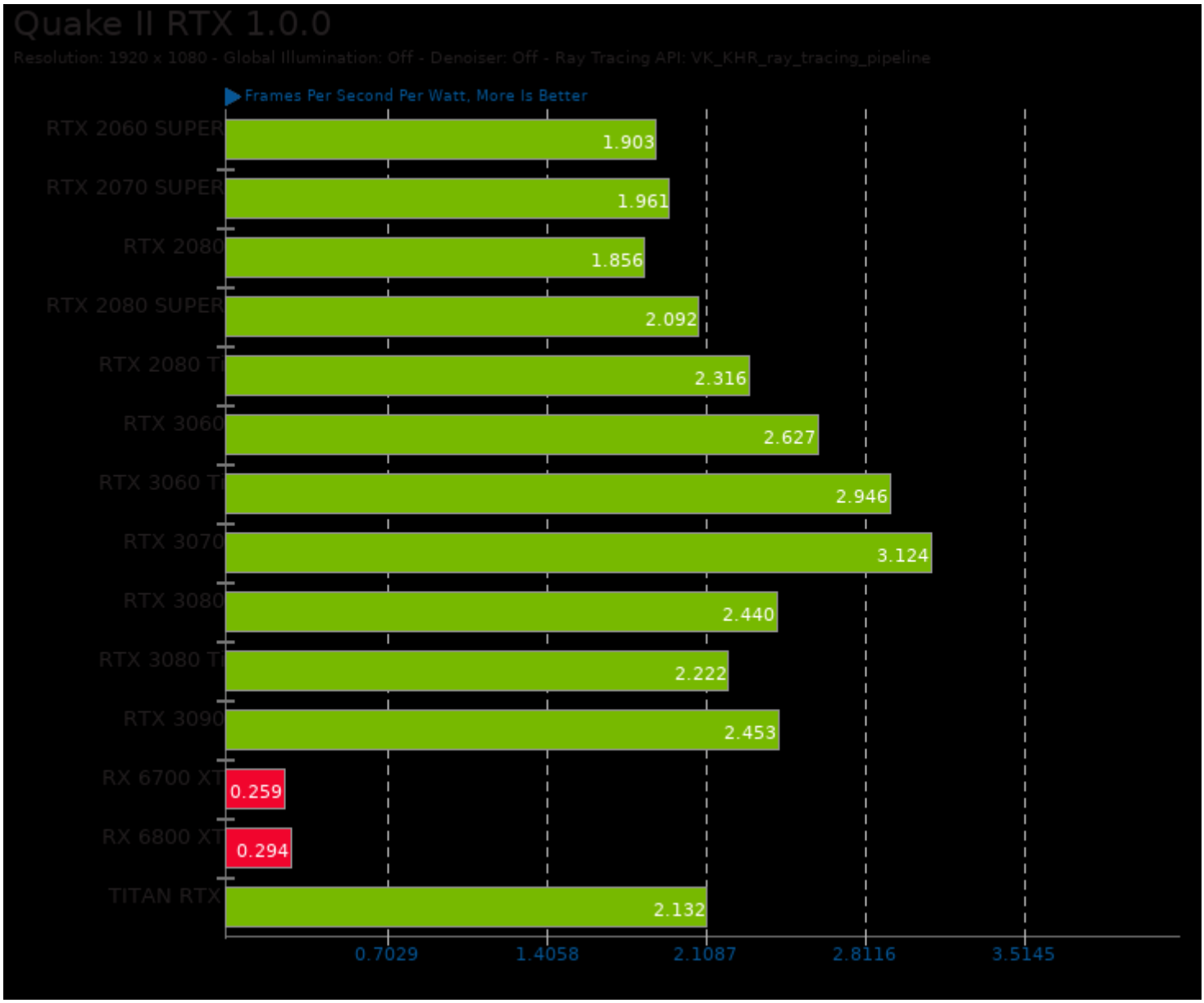

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.481
RTX 2070 SUPER
0.475
RTX 2080
0.503
RTX 2080 SUPER
0.519
RTX 2080 Ti
0.648
RTX 3060
0.658
RTX 3060 Ti
0.804
RTX 3070
0.902
RTX 3080
0.835
RTX 3080 Ti
0.818
RTX 3090
0.876
RX 6700 XT
0.147
RX 6800 XT
0.122
TITAN RTX
0.623
0.203
0.406
0.609
0.812
1.015

Vulkan Ray-Tracing GPUs

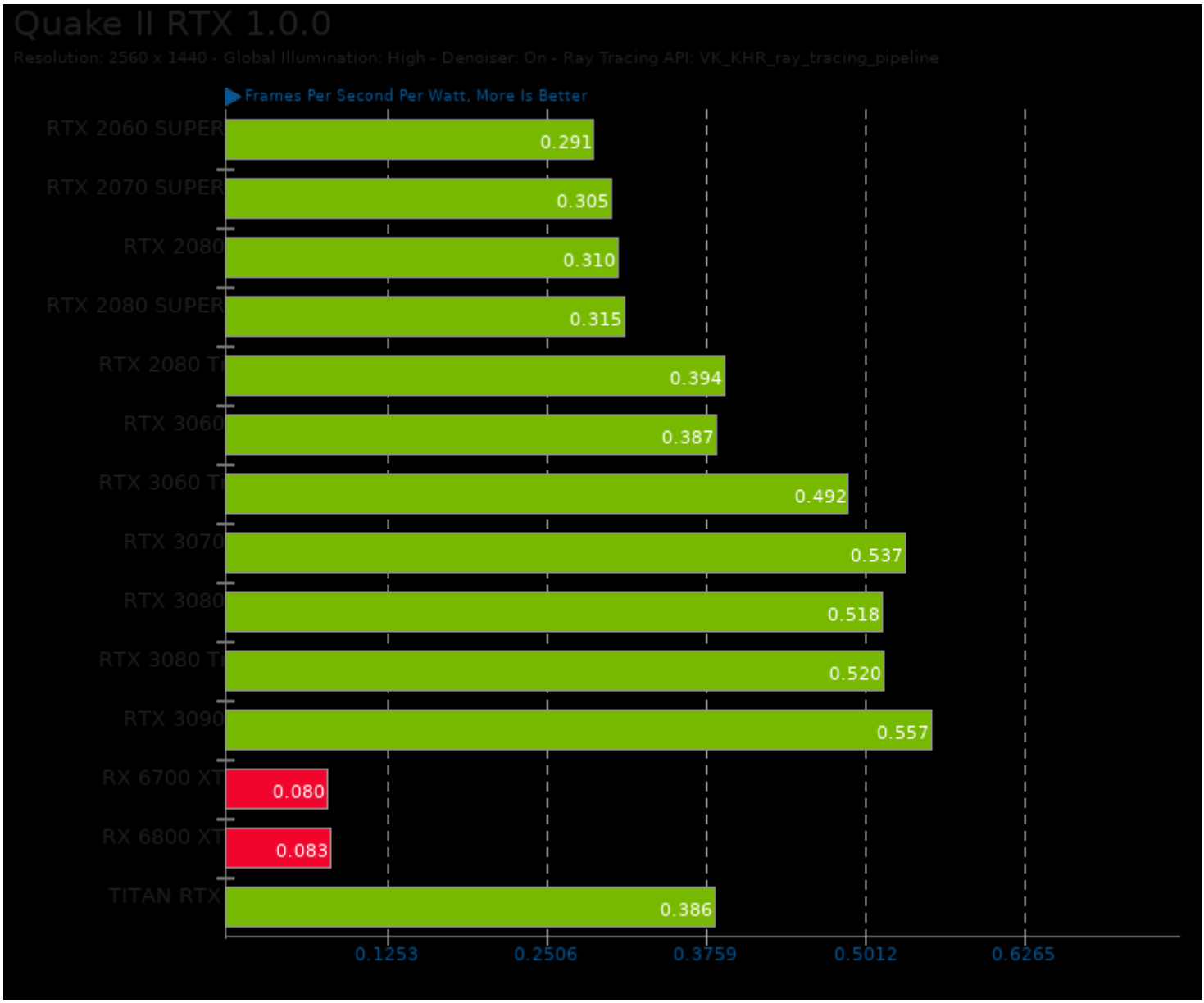


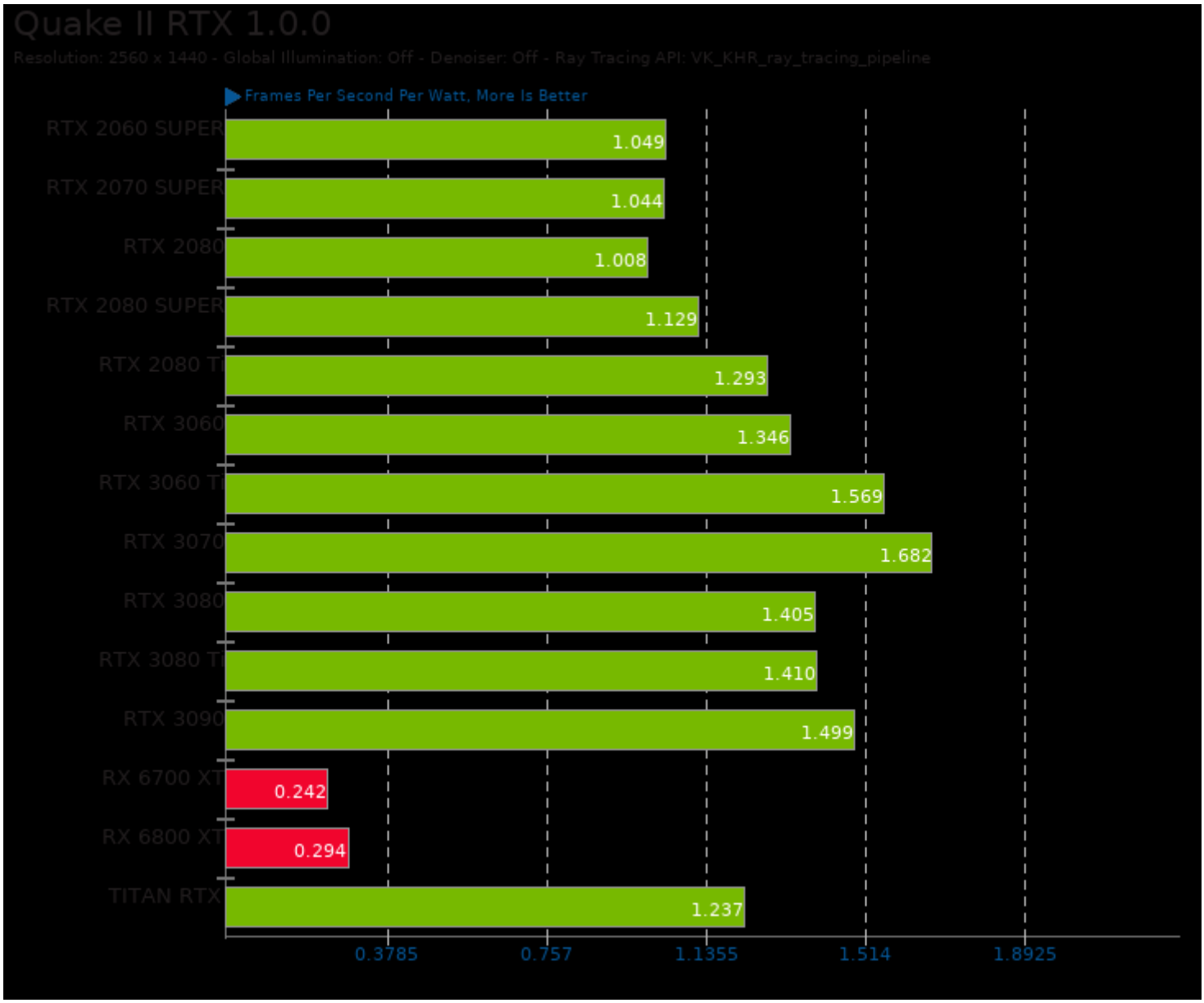
Vulkan Ray-Tracing GPUs

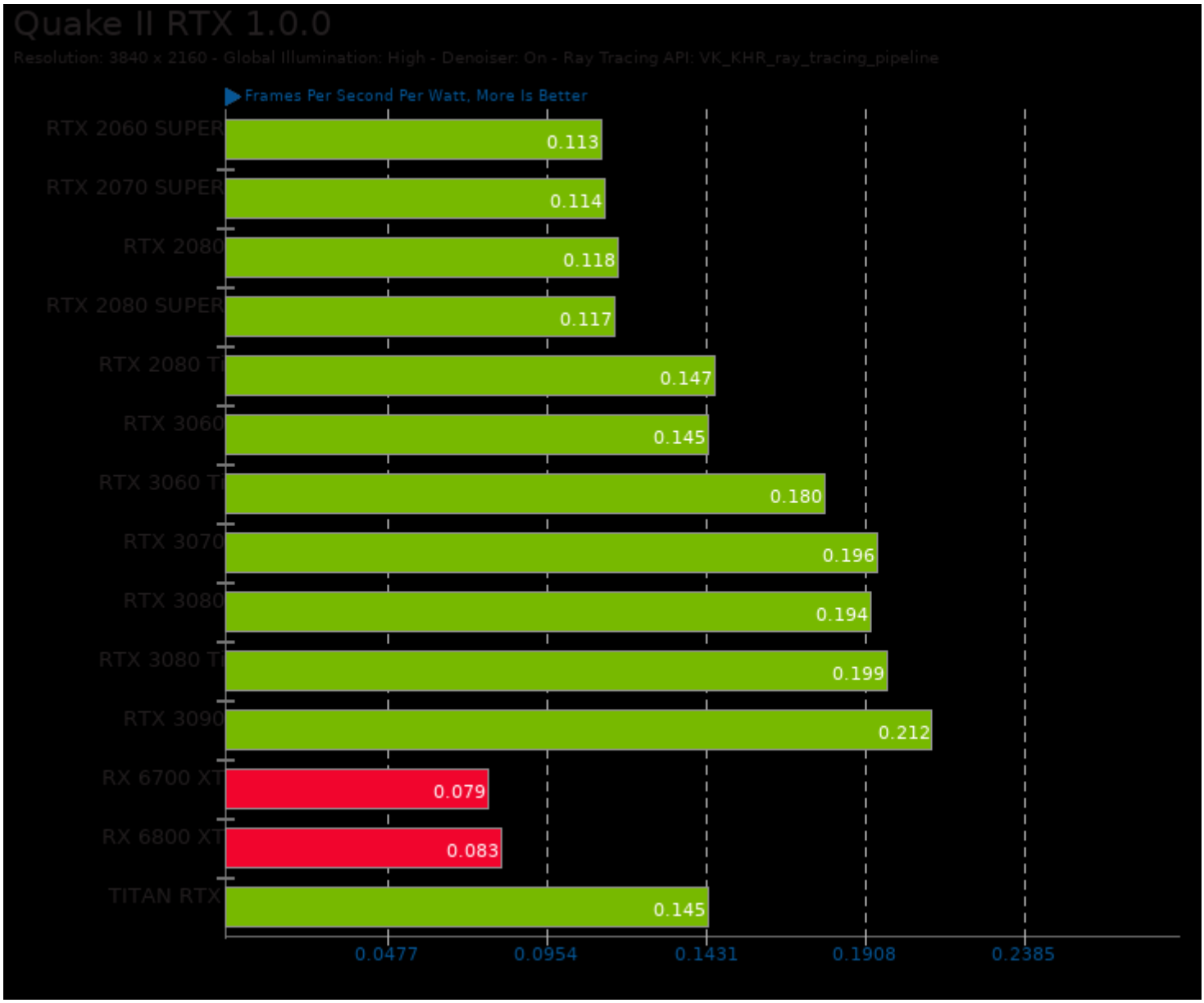



Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
1.903
RTX 2070 SUPER
1.961
RTX 2080
1.856
RTX 2080 SUPER
2.092
RTX 2080 Ti
2.316
RTX 3060
2.627
RTX 3060 Ti
2.946
RTX 3070
3.124
RTX 3080
2.440
RTX 3080 Ti
2.222
RTX 3090
2.453
RX 6700 XT
0.259
RX 6800 XT
0.294
TITAN RTX
2.132
0.7029
1.4058
2.1087
2.8116
3.5145

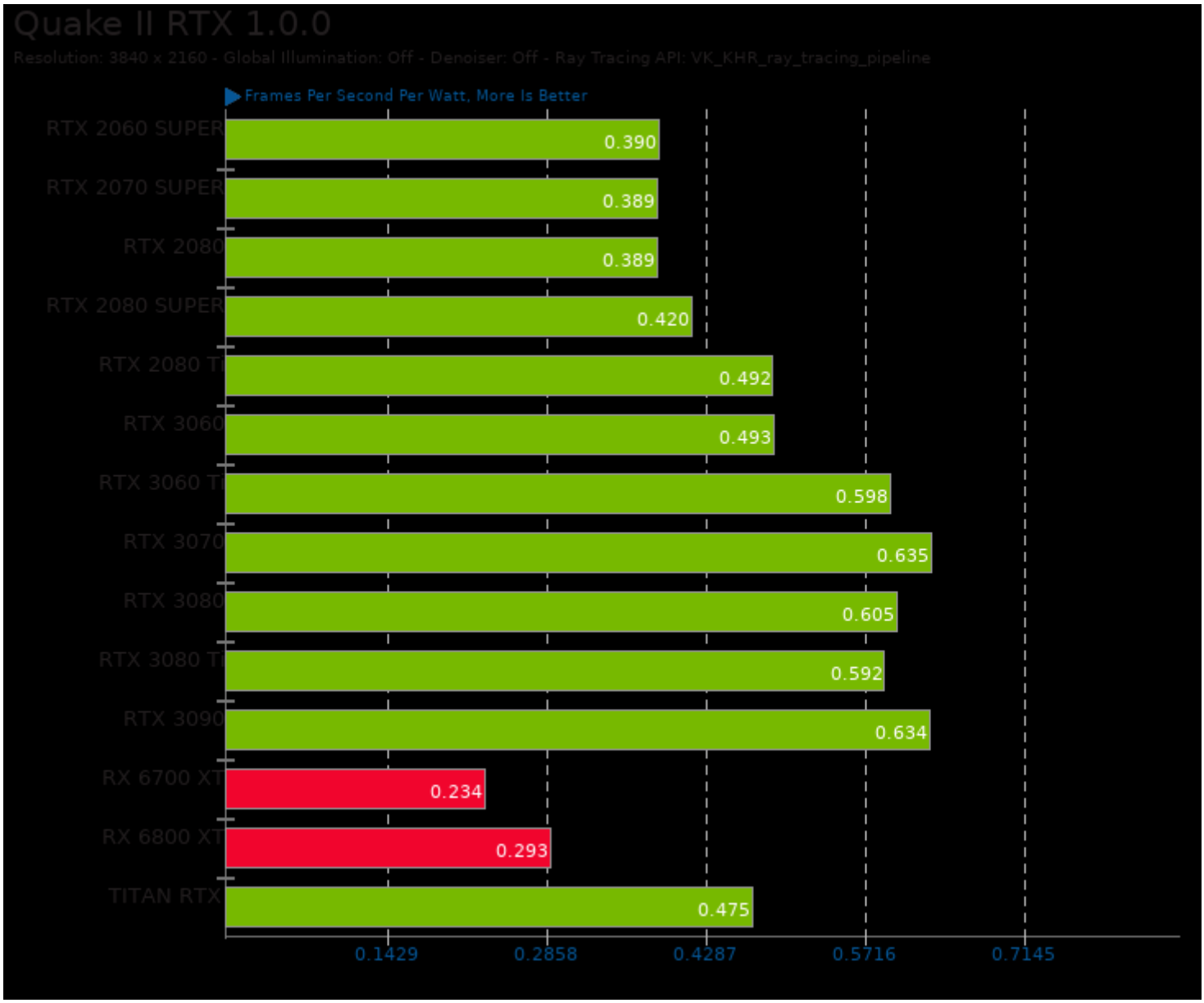
Vulkan Ray-Tracing GPUs

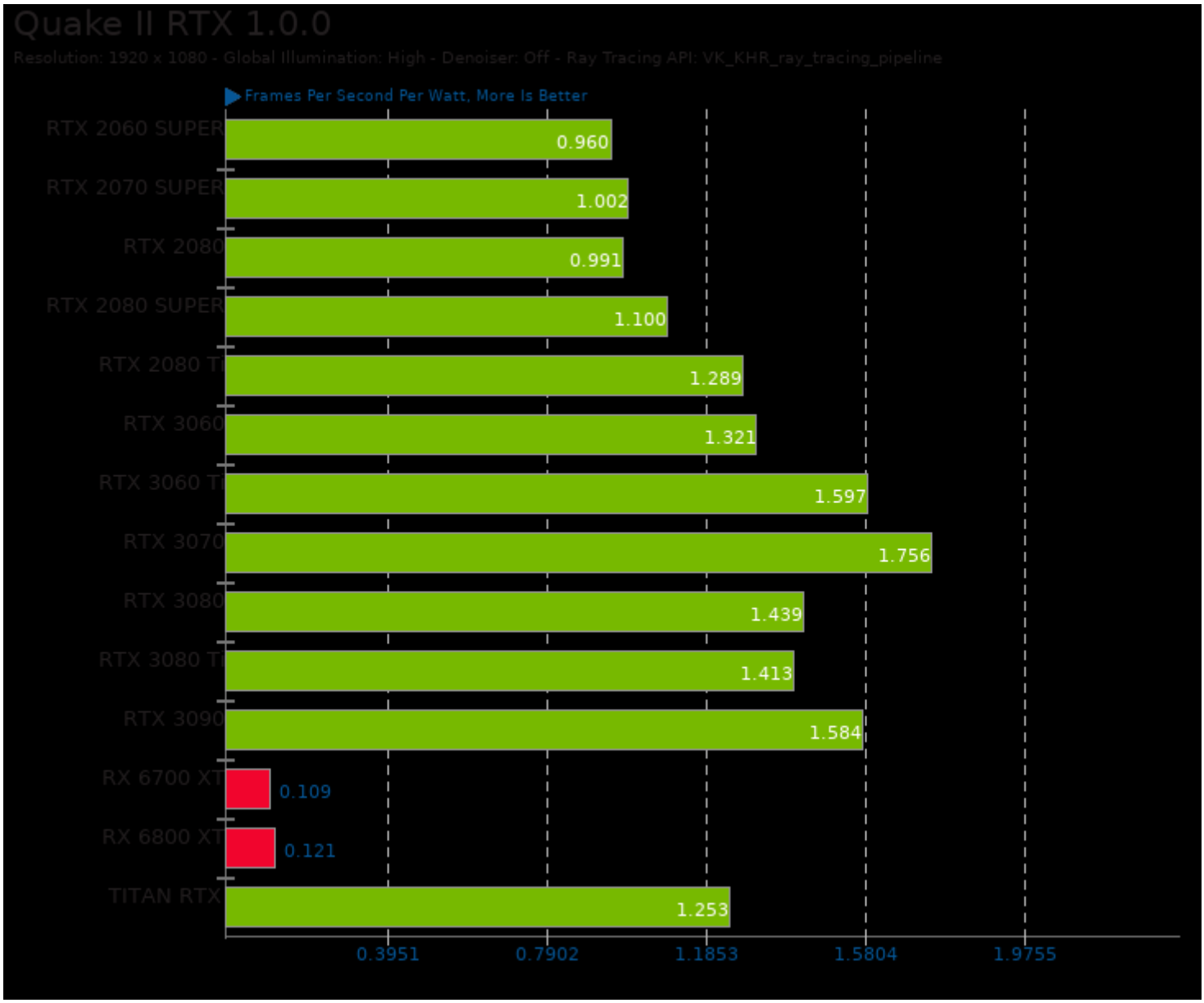


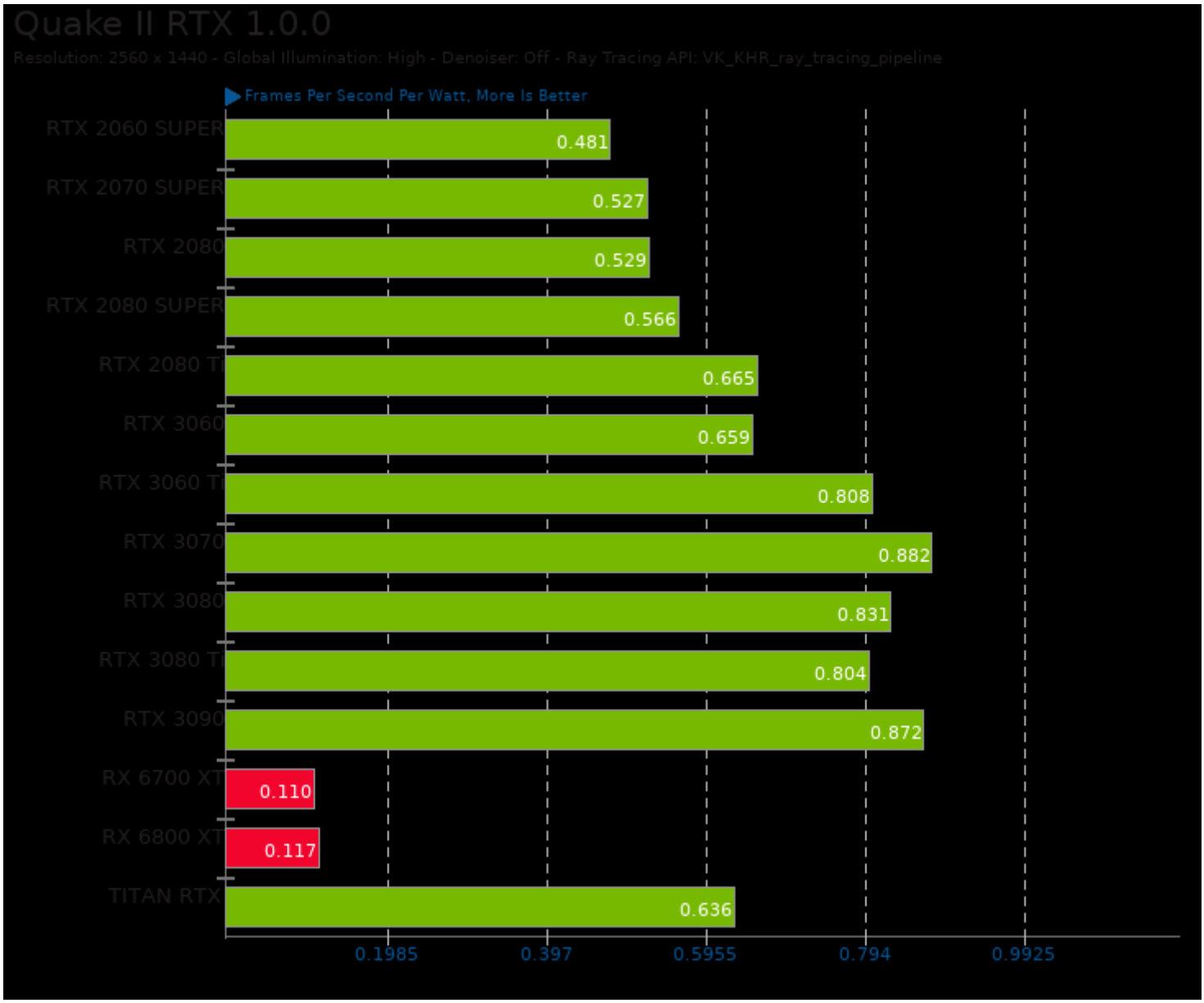

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: Off - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
1.049
RTX 2070 SUPER
1.044
RTX 2080
1.008
RTX 2080 SUPER
1.129
RTX 2080 Ti
1.293
RTX 3060
1.346
RTX 3060 Ti
1.569
RTX 3070
1.682
RTX 3080
1.405
RTX 3080 Ti
1.410
RTX 3090
1.499
RX 6700 XT
0.242
RX 6800 XT
0.294
TITAN RTX
1.237
0.3785
0.757
1.1355
1.514
1.8925

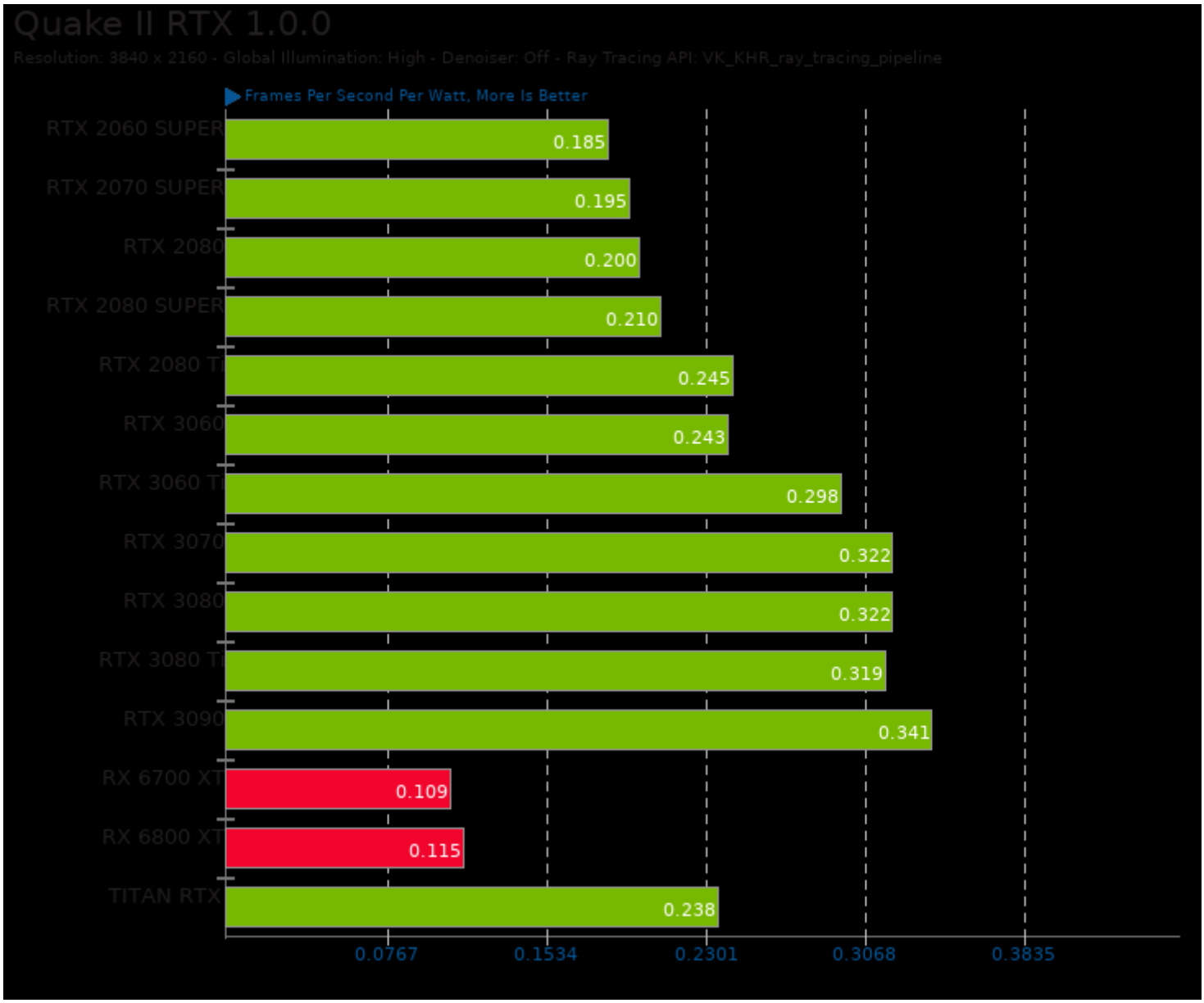

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: On - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.113
RTX 2070 SUPER
0.114
RTX 2080
0.118
RTX 2080 SUPER
0.117
RTX 2080 Ti
0.147
RTX 3060
0.145
RTX 3060 Ti
0.180
RTX 3070
0.196
RTX 3080
0.194
RTX 3080 Ti
0.199
RTX 3090
0.212
RX 6700 XT
0.079
RX 6800 XT
0.083
TITAN RTX
0.145
0.0477
0.0954
0.1431
0.1908
0.2385

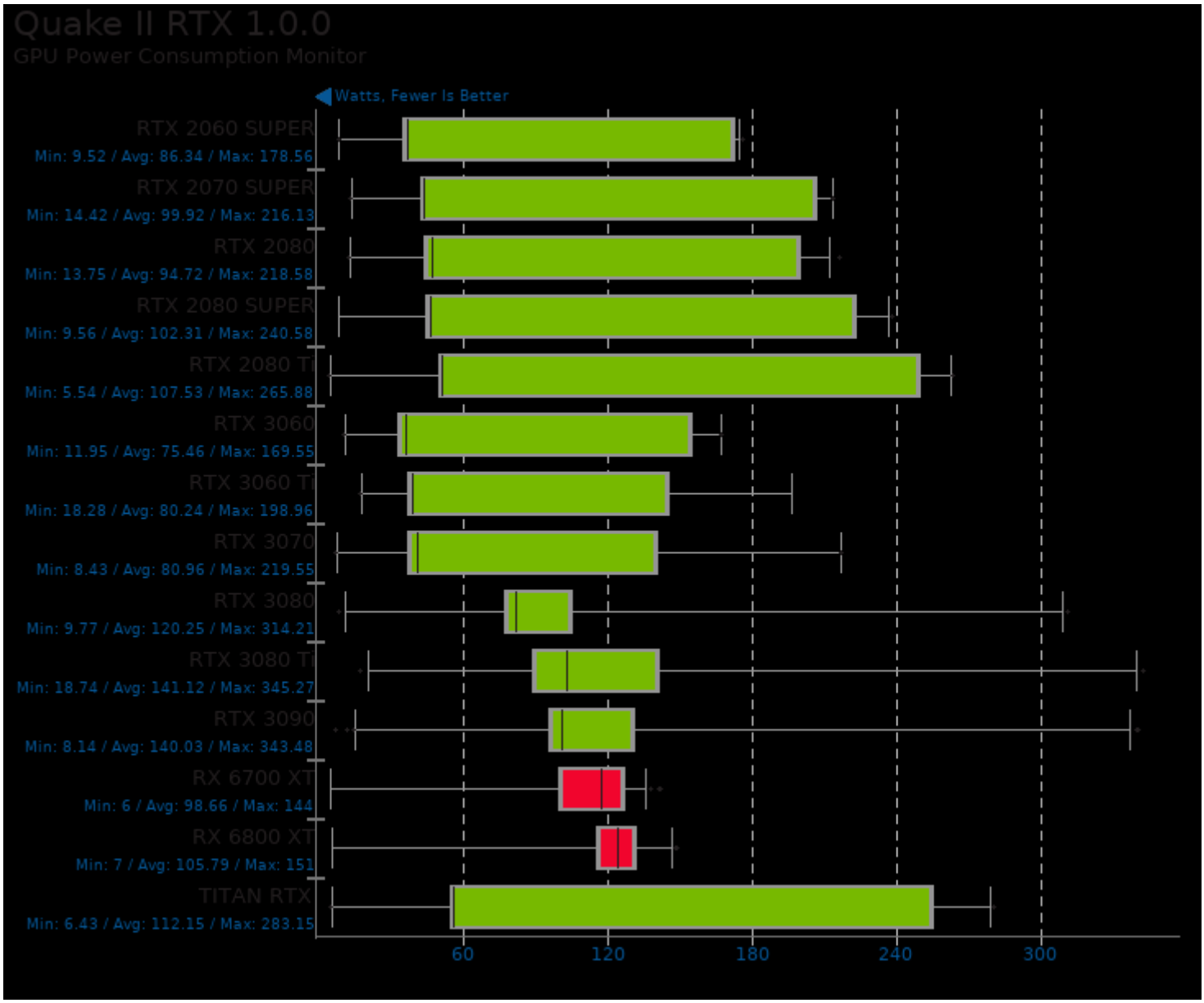
Vulkan Ray-Tracing GPUs

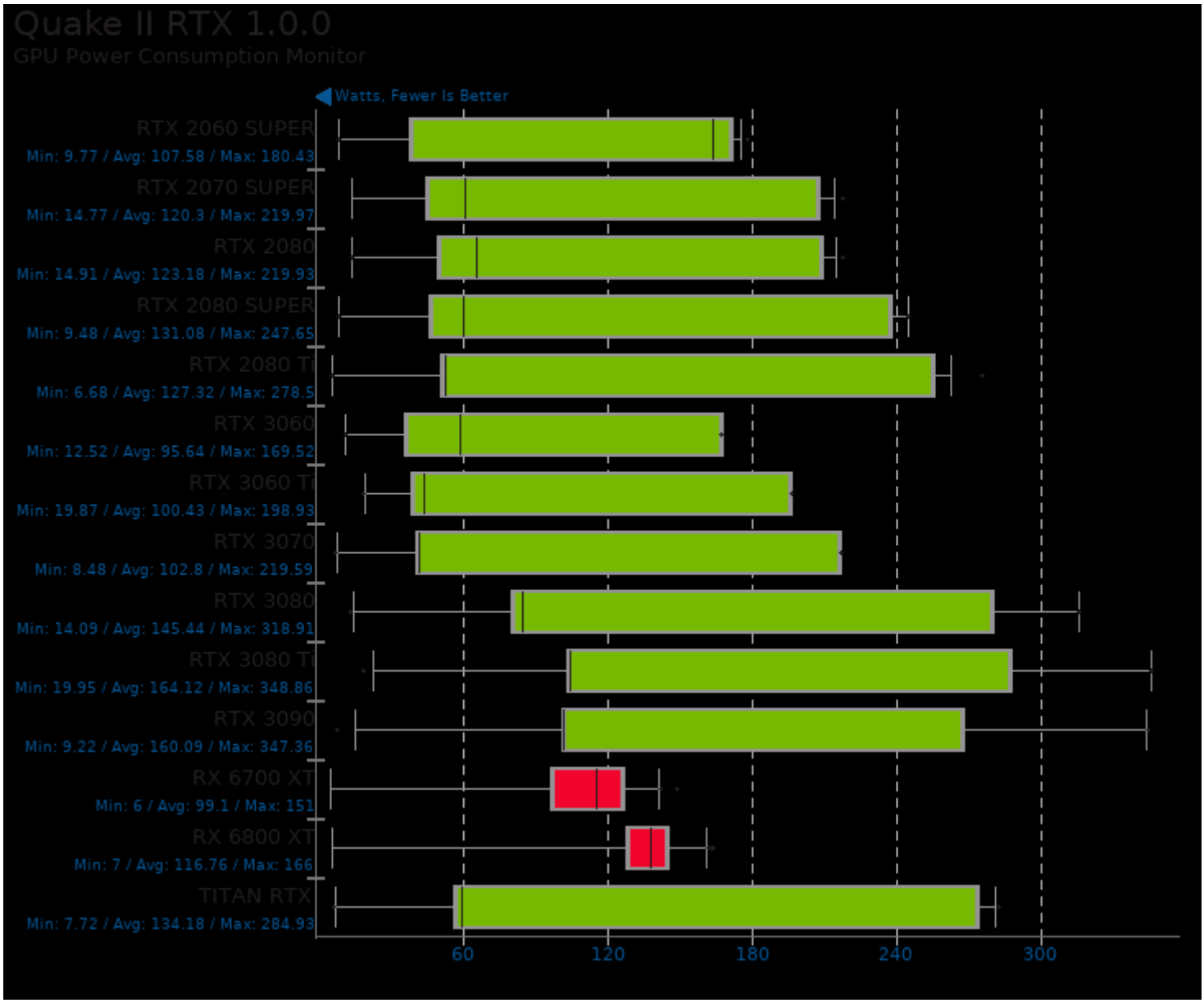


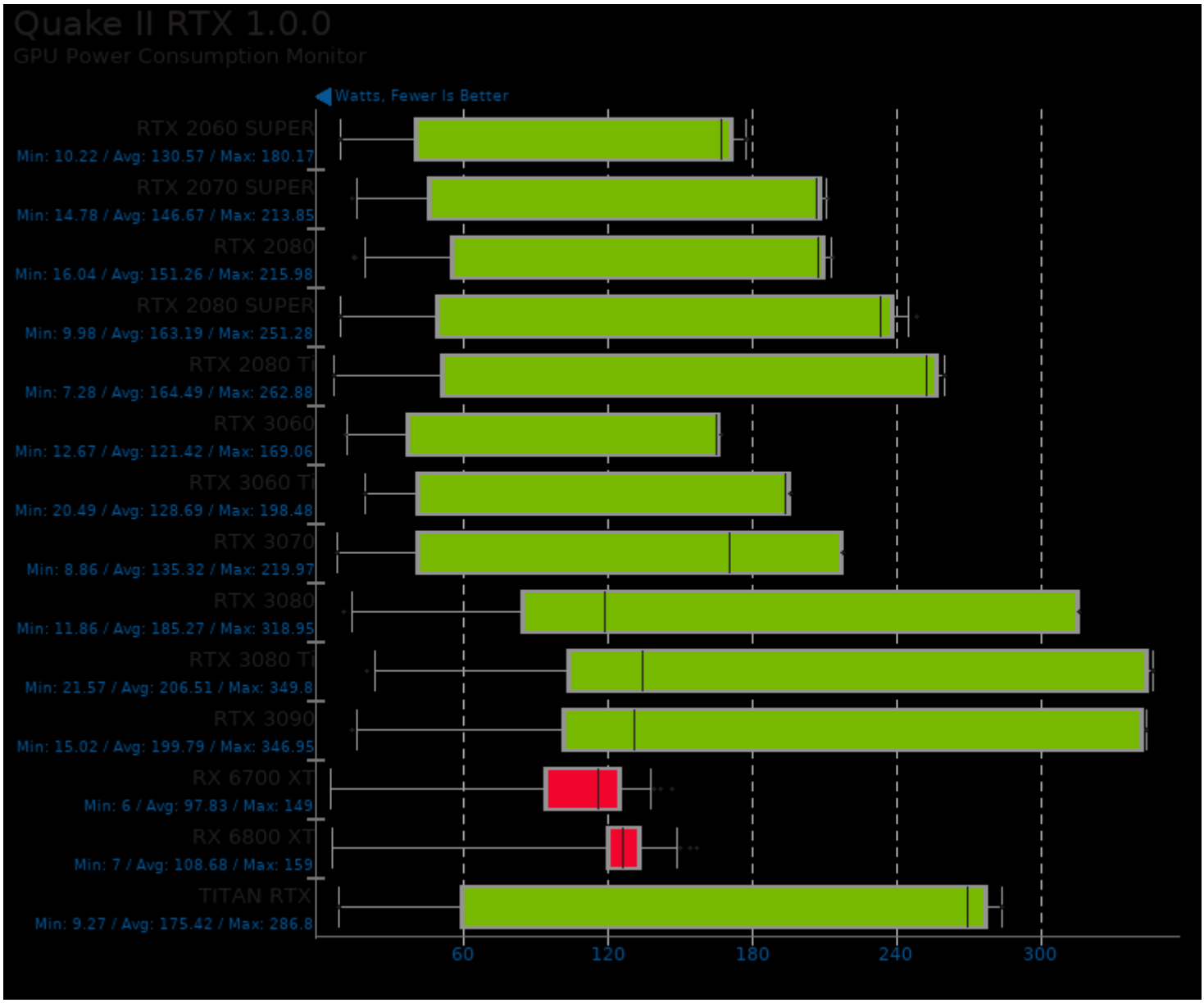

Quake II RTX 1.0.0
Resolution: 1920 x 1080 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.960
RTX 2070 SUPER
1.002
RTX 2080
0.991
RTX 2080 SUPER
1.100
RTX 2080 Ti
1.289
RTX 3060
1.321
RTX 3060 Ti
1.597
RTX 3070
1.756
RTX 3080
1.439
RTX 3080 Ti
1.413
RTX 3090
1.584
RX 6700 XT
0.109
RX 6800 XT
0.121
TITAN RTX
1.253
0.3951
0.7902
1.1853
1.5804
1.9755

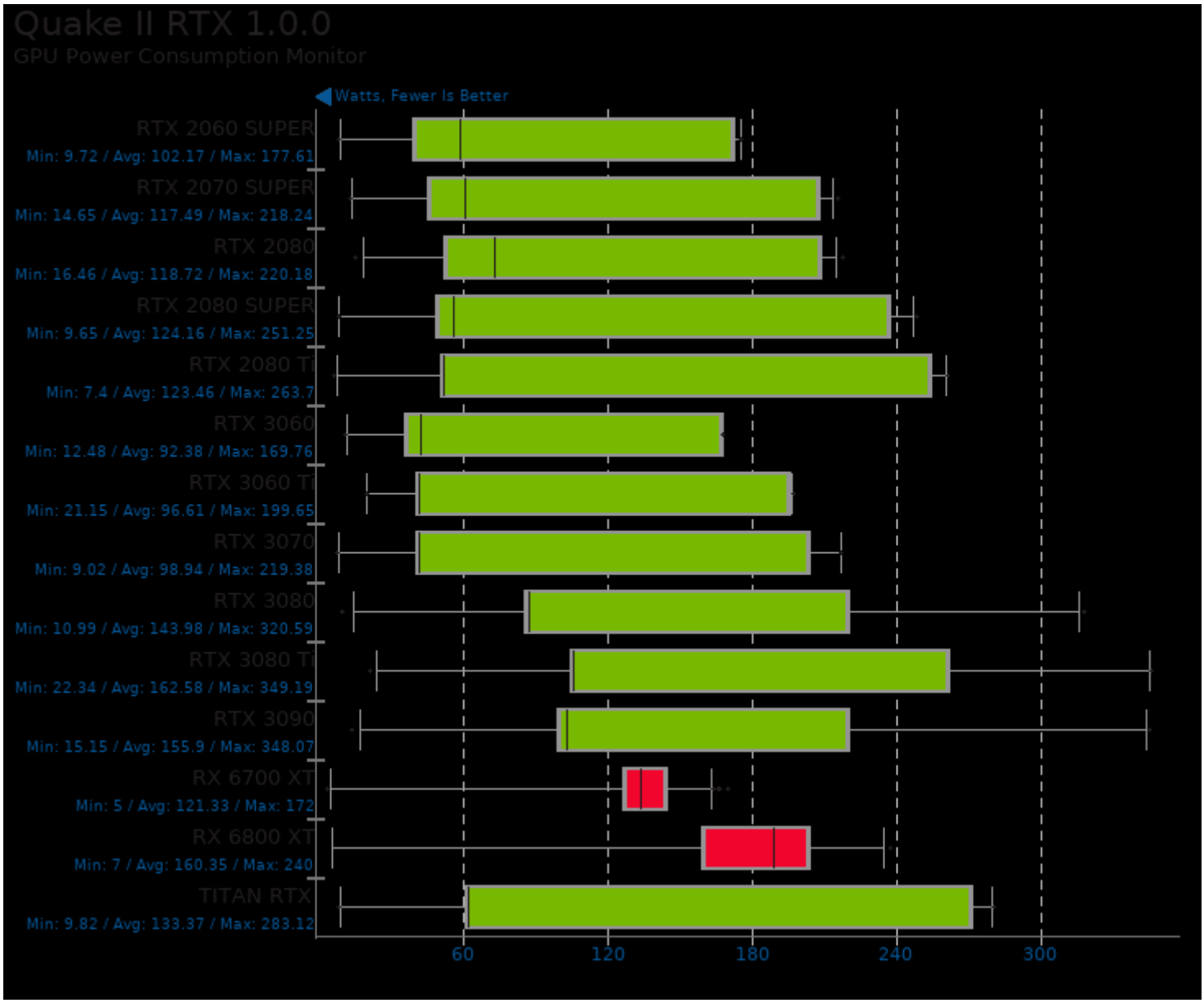

Quake II RTX 1.0.0
Resolution: 2560 x 1440 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.481
RTX 2070 SUPER
0.527
RTX 2080
0.529
RTX 2080 SUPER
0.566
RTX 2080 Ti
0.665
RTX 3060
0.659
RTX 3060 Ti
0.808
RTX 3070
0.882
RTX 3080
0.831
RTX 3080 Ti
0.804
RTX 3090
0.872
RX 6700 XT
0.110
RX 6800 XT
0.117
TITAN RTX
0.636
0.1985
0.397
0.5955
0.794
0.9925

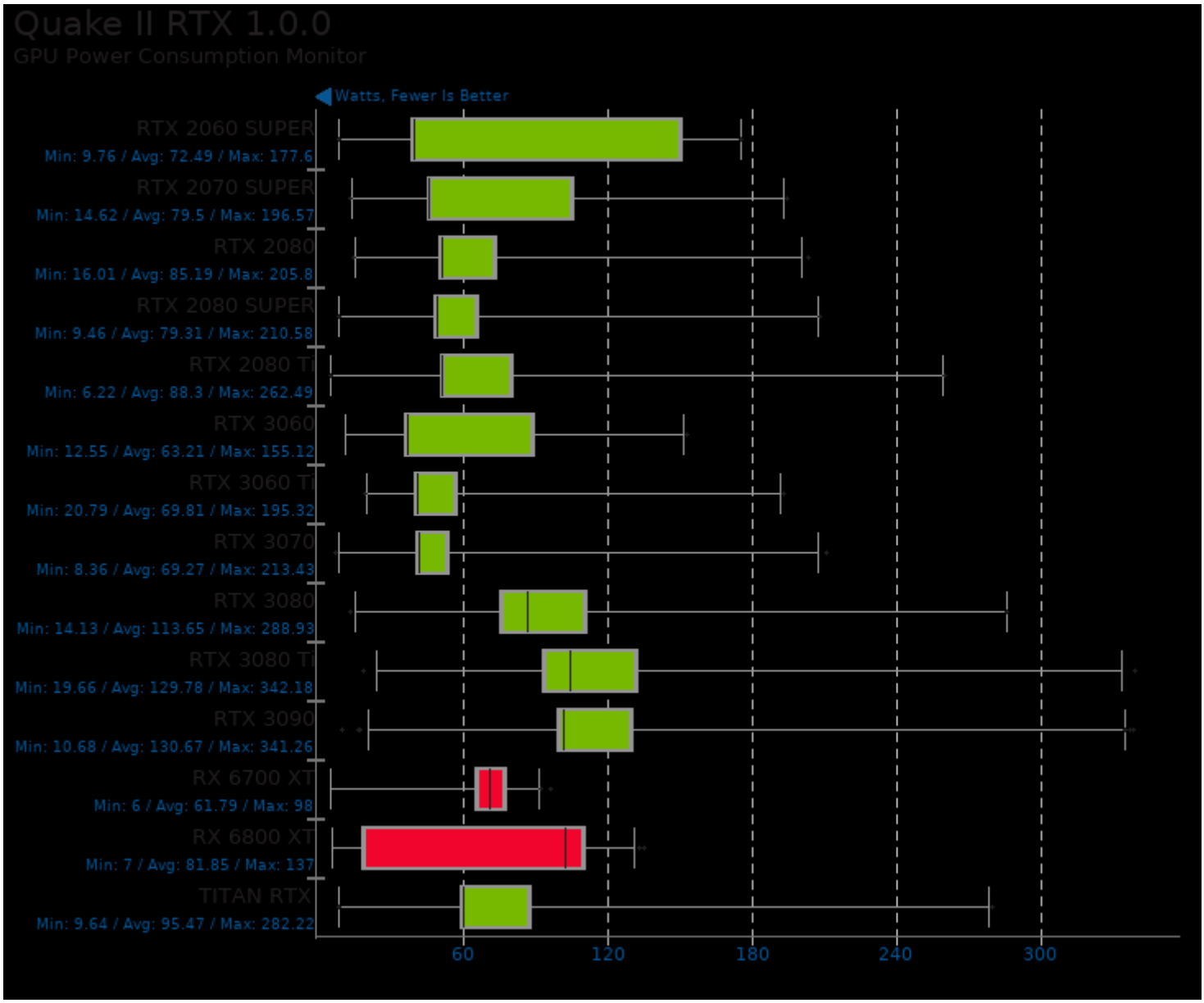

Quake II RTX 1.0.0
Resolution: 3840 x 2160 - Global Illumination: High - Denoiser: Off - Ray Tracing API: VK_KHR_ray_tracing_pipeline
Frames Per Second Per Watt, More Is Better
RTX 2060 SUPER
0.185
RTX 2070 SUPER
0.195
RTX 2080
0.200
RTX 2080 SUPER
0.210
RTX 2080 Ti
0.245
RTX 3060
0.243
RTX 3060 Ti
0.298
RTX 3070
0.322
RTX 3080
0.322
RTX 3080 Ti
0.319
RTX 3090
0.341
RX 6700 XT
0.109
RX 6800 XT
0.115
TITAN RTX
0.238
0.0767
0.1534
0.2301
0.3068
0.3835

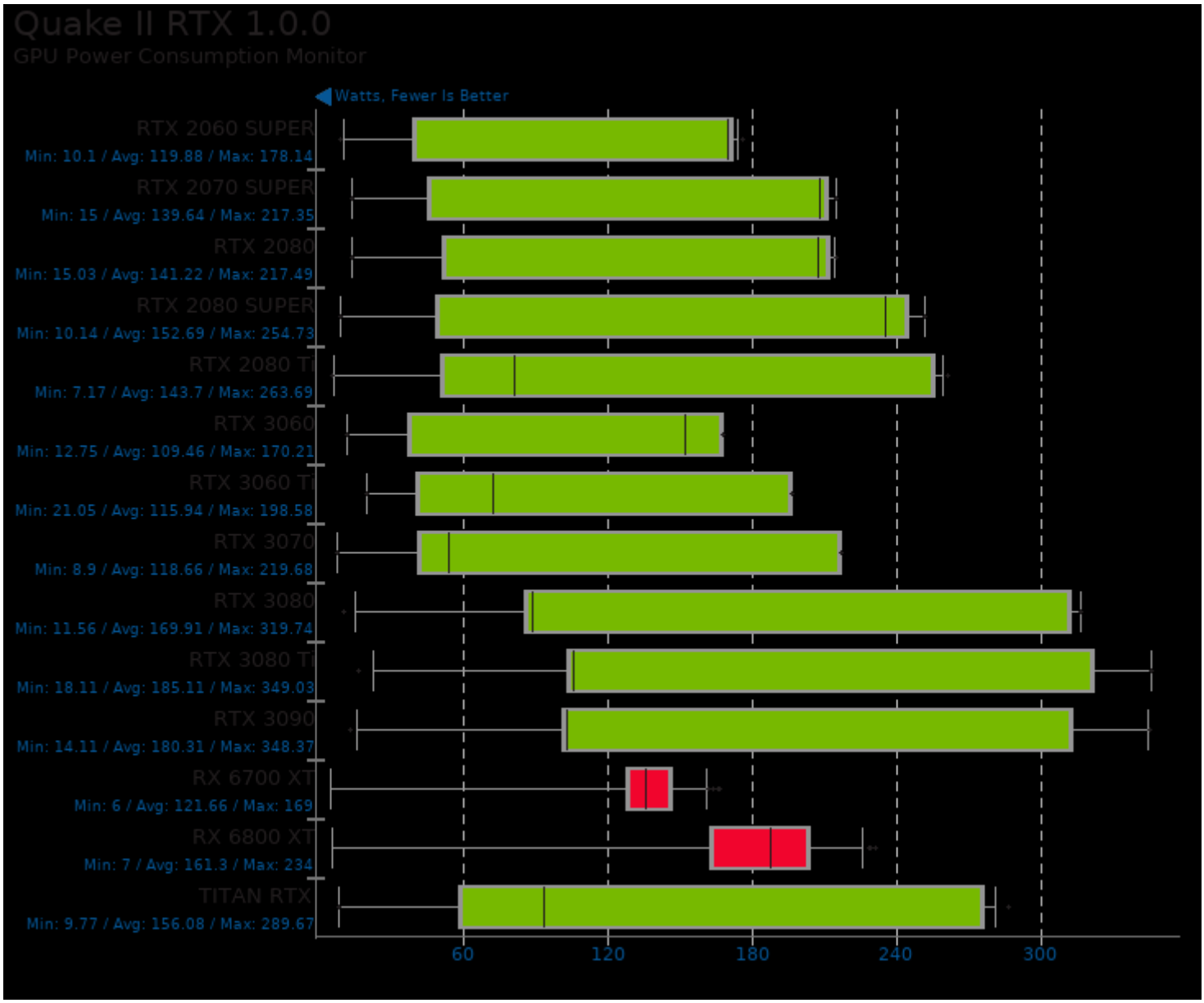

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.52 / Avg: 86.34 / Max: 178.56
RTX 2070 SUPER
Min: 14.42 / Avg: 99.92 / Max: 216.13
RTX 2080
Min: 13.75 / Avg: 94.72 / Max: 218.58
RTX 2080 SUPER
Min: 9.56 / Avg: 102.31 / Max: 240.58
RTX 2080 Ti
Min: 5.54 / Avg: 107.53 / Max: 265.88
RTX 3060
Min: 11.95 / Avg: 75.46 / Max: 169.55
RTX 3060 Ti
Min: 18.28 / Avg: 80.24 / Max: 198.96
RTX 3070
Min: 8.43 / Avg: 80.96 / Max: 219.55
RTX 3080
Min: 9.77 / Avg: 120.25 / Max: 314.21
RTX 3080 Ti
Min: 18.74 / Avg: 141.12 / Max: 345.27
RTX 3090
Min: 8.14 / Avg: 140.03 / Max: 343.48
RX 6700 XT
Min: 6 / Avg: 98.66 / Max: 144
RX 6800 XT
Min: 7 / Avg: 105.79 / Max: 151
TITAN RTX
Min: 6.43 / Avg: 112.15 / Max: 283.15
60
120
180
240
300

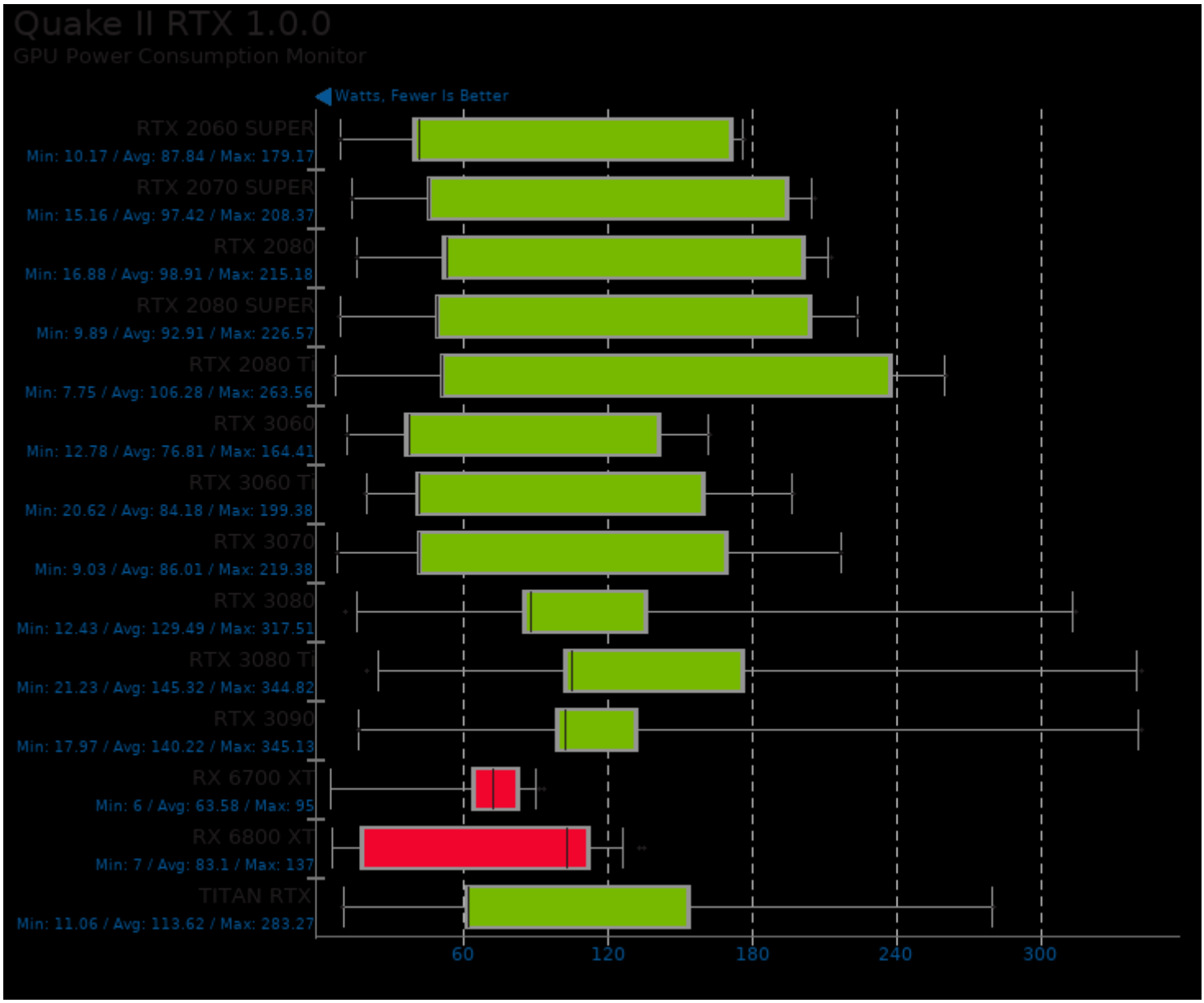

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.77 / Avg: 107.58 / Max: 180.43
RTX 2070 SUPER
Min: 14.77 / Avg: 120.3 / Max: 219.97
RTX 2080
Min: 14.91 / Avg: 123.18 / Max: 219.93
RTX 2080 SUPER
Min: 9.48 / Avg: 131.08 / Max: 247.65
RTX 2080 Ti
Min: 6.68 / Avg: 127.32 / Max: 278.5
RTX 3060
Min: 12.52 / Avg: 95.64 / Max: 169.52
RTX 3060 Ti
Min: 19.87 / Avg: 100.43 / Max: 198.93
RTX 3070
Min: 8.48 / Avg: 102.8 / Max: 219.59
RTX 3080
Min: 14.09 / Avg: 145.44 / Max: 318.91
RTX 3080 Ti
Min: 19.95 / Avg: 164.12 / Max: 348.86
RTX 3090
Min: 9.22 / Avg: 160.09 / Max: 347.36
RX 6700 XT
Min: 6 / Avg: 99.1 / Max: 151
RX 6800 XT
Min: 7 / Avg: 116.76 / Max: 166
TITAN RTX
Min: 7.72 / Avg: 134.18 / Max: 284.93
60
120
180
240
300

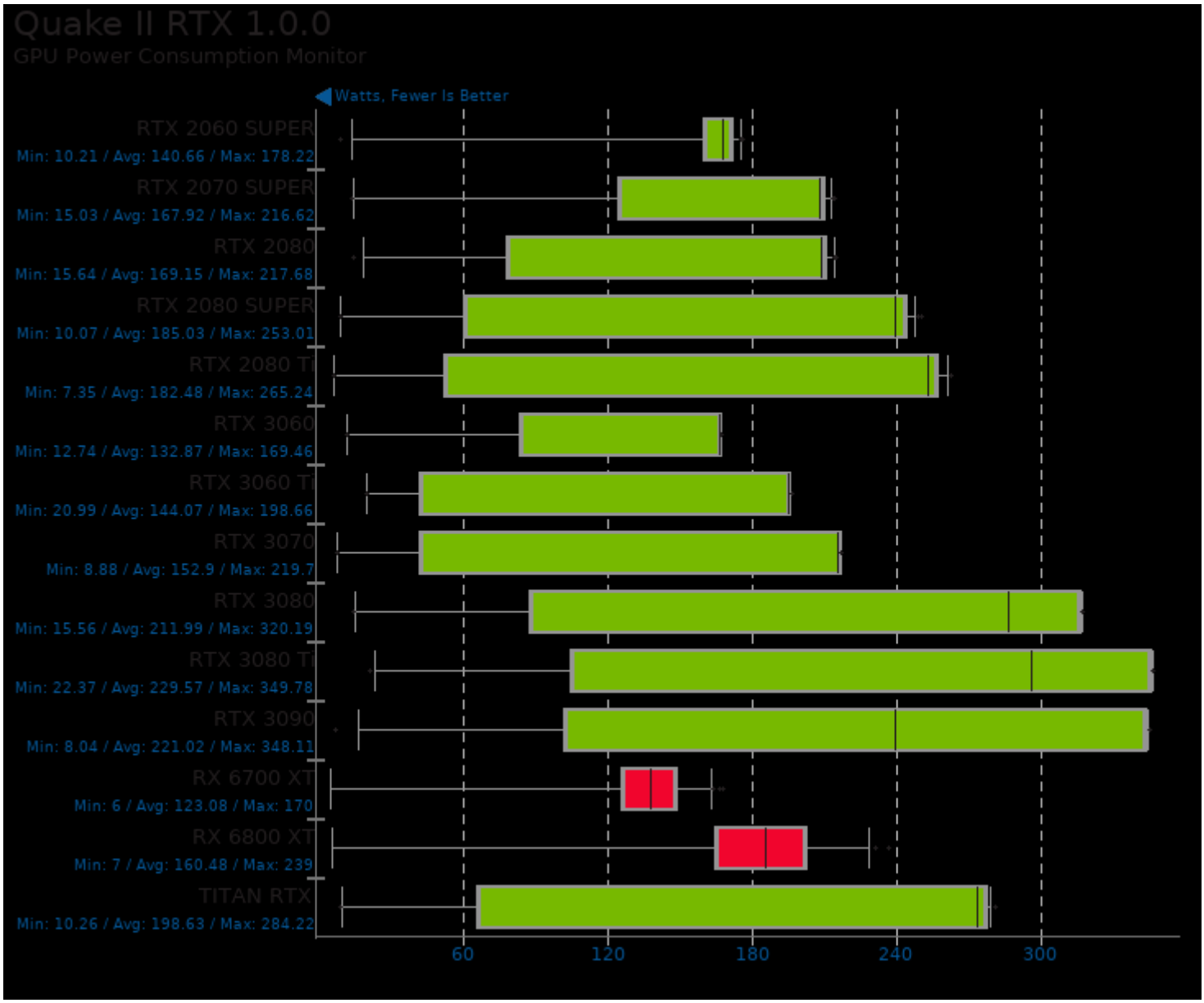

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.22 / Avg: 130.57 / Max: 180.17
RTX 2070 SUPER
Min: 14.78 / Avg: 146.67 / Max: 213.85
RTX 2080
Min: 16.04 / Avg: 151.26 / Max: 215.98
RTX 2080 SUPER
Min: 9.98 / Avg: 163.19 / Max: 251.28
RTX 2080 Ti
Min: 7.28 / Avg: 164.49 / Max: 262.88
RTX 3060
Min: 12.67 / Avg: 121.42 / Max: 169.06
RTX 3060 Ti
Min: 20.49 / Avg: 128.69 / Max: 198.48
RTX 3070
Min: 8.86 / Avg: 135.32 / Max: 219.97
RTX 3080
Min: 11.86 / Avg: 185.27 / Max: 318.95
RTX 3080 Ti
Min: 21.57 / Avg: 206.51 / Max: 349.8
RTX 3090
Min: 15.02 / Avg: 199.79 / Max: 346.95
RX 6700 XT
Min: 6 / Avg: 97.83 / Max: 149
RX 6800 XT
Min: 7 / Avg: 108.68 / Max: 159
TITAN RTX
Min: 9.27 / Avg: 175.42 / Max: 286.8
60
120
180
240
300

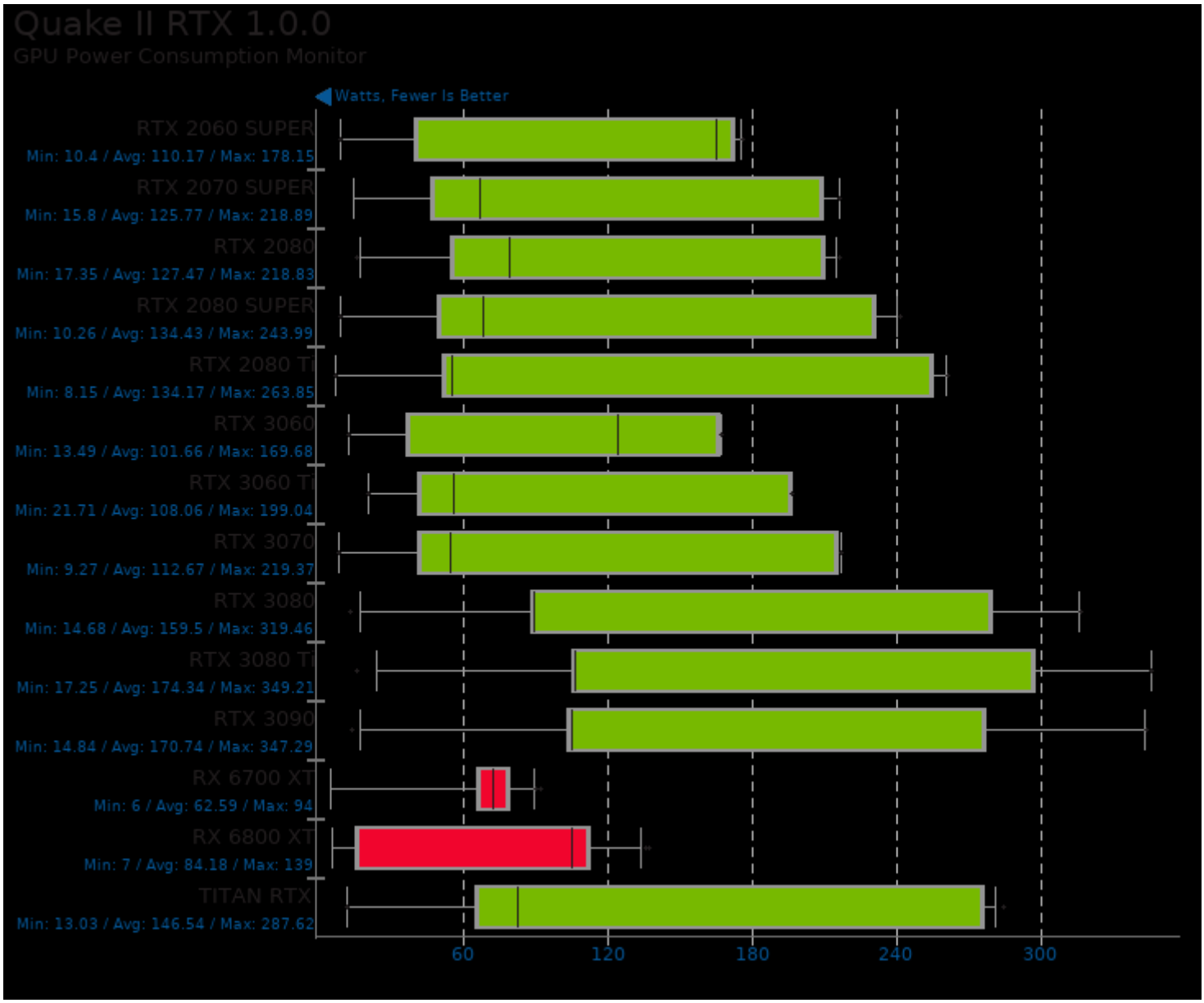

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.72 / Avg: 102.17 / Max: 177.61
RTX 2070 SUPER
Min: 14.65 / Avg: 117.49 / Max: 218.24
RTX 2080
Min: 16.46 / Avg: 118.72 / Max: 220.18
RTX 2080 SUPER
Min: 9.65 / Avg: 124.16 / Max: 251.25
RTX 2080 Ti
Min: 7.4 / Avg: 123.46 / Max: 263.7
RTX 3060
Min: 12.48 / Avg: 92.38 / Max: 169.76
RTX 3060 Ti
Min: 21.15 / Avg: 96.61 / Max: 199.65
RTX 3070
Min: 9.02 / Avg: 98.94 / Max: 219.38
RTX 3080
Min: 10.99 / Avg: 143.98 / Max: 320.59
RTX 3080 Ti
Min: 22.34 / Avg: 162.58 / Max: 349.19
RTX 3090
Min: 15.15 / Avg: 155.9 / Max: 348.07
RX 6700 XT
Min: 5 / Avg: 121.33 / Max: 172
RX 6800 XT
Min: 7 / Avg: 160.35 / Max: 240
TITAN RTX
Min: 9.82 / Avg: 133.37 / Max: 283.12
60
120
180
240
300

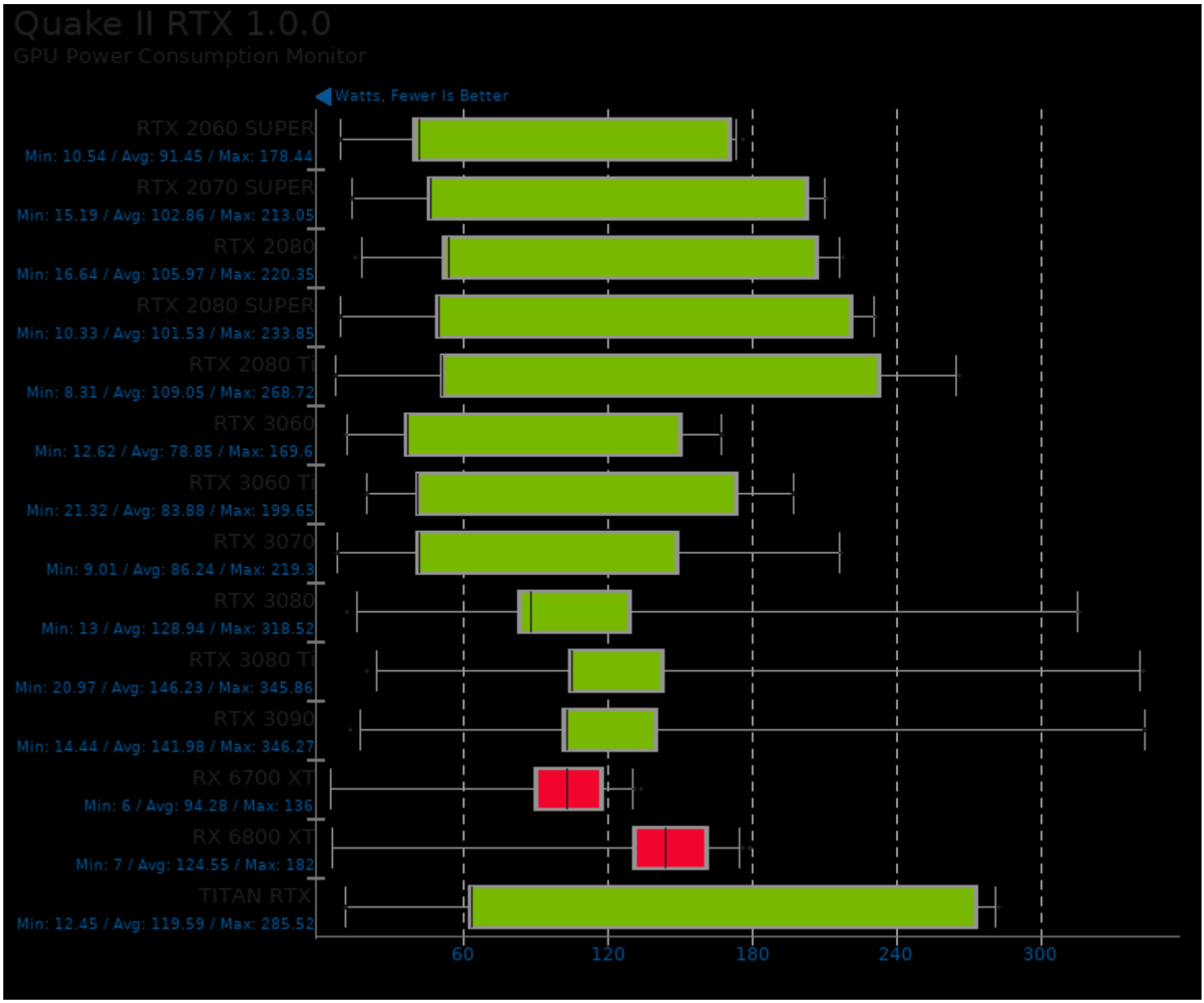

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.76 / Avg: 72.49 / Max: 177.6
RTX 2070 SUPER
Min: 14.62 / Avg: 79.5 / Max: 196.57
RTX 2080
Min: 16.01 / Avg: 85.19 / Max: 205.8
RTX 2080 SUPER
Min: 9.46 / Avg: 79.31 / Max: 210.58
RTX 2080 Ti
Min: 6.22 / Avg: 88.3 / Max: 262.49
RTX 3060
Min: 12.55 / Avg: 63.21 / Max: 155.12
RTX 3060 Ti
Min: 20.79 / Avg: 69.81 / Max: 195.32
RTX 3070
Min: 8.36 / Avg: 69.27 / Max: 213.43
RTX 3080
Min: 14.13 / Avg: 113.65 / Max: 288.93
RTX 3080 Ti
Min: 19.66 / Avg: 129.78 / Max: 342.18
RTX 3090
Min: 10.68 / Avg: 130.67 / Max: 341.26
RX 6700 XT
Min: 6 / Avg: 61.79 / Max: 98
RX 6800 XT
Min: 7 / Avg: 81.85 / Max: 137
TITAN RTX
Min: 9.64 / Avg: 95.47 / Max: 282.22
60
120
180
240
300

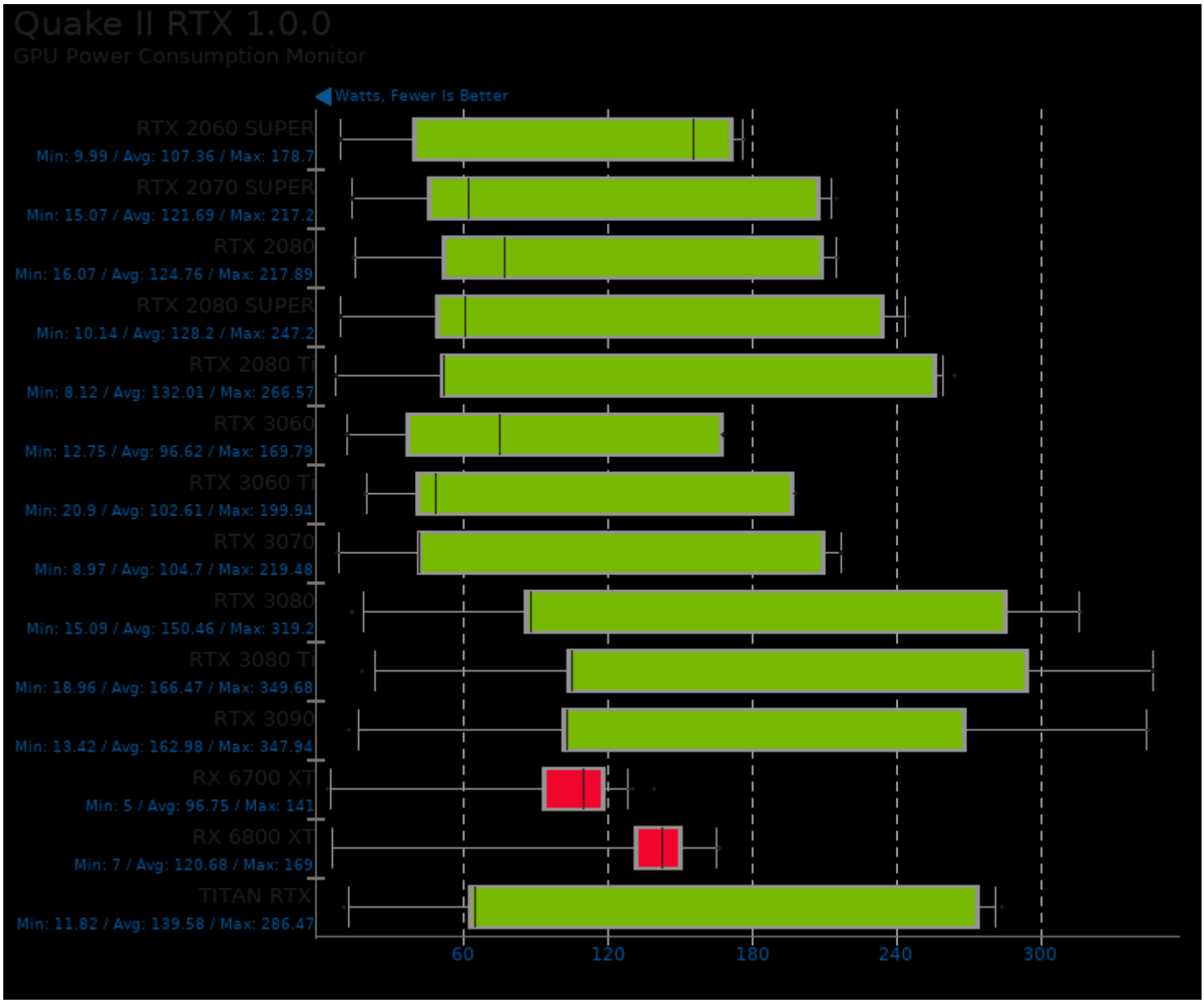

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.1 / Avg: 119.88 / Max: 178.14
RTX 2070 SUPER
Min: 15 / Avg: 139.64 / Max: 217.35
RTX 2080
Min: 15.03 / Avg: 141.22 / Max: 217.49
RTX 2080 SUPER
Min: 10.14 / Avg: 152.69 / Max: 254.73
RTX 2080 Ti
Min: 7.17 / Avg: 143.7 / Max: 263.69
RTX 3060
Min: 12.75 / Avg: 109.46 / Max: 170.21
RTX 3060 Ti
Min: 21.05 / Avg: 115.94 / Max: 198.58
RTX 3070
Min: 8.9 / Avg: 118.66 / Max: 219.68
RTX 3080
Min: 11.56 / Avg: 169.91 / Max: 319.74
RTX 3080 Ti
Min: 18.11 / Avg: 185.11 / Max: 349.03
RTX 3090
Min: 14.11 / Avg: 180.31 / Max: 348.37
RX 6700 XT
Min: 6 / Avg: 121.66 / Max: 169
RX 6800 XT
Min: 7 / Avg: 161.3 / Max: 234
TITAN RTX
Min: 9.77 / Avg: 156.08 / Max: 289.67
60
120
180
240
300

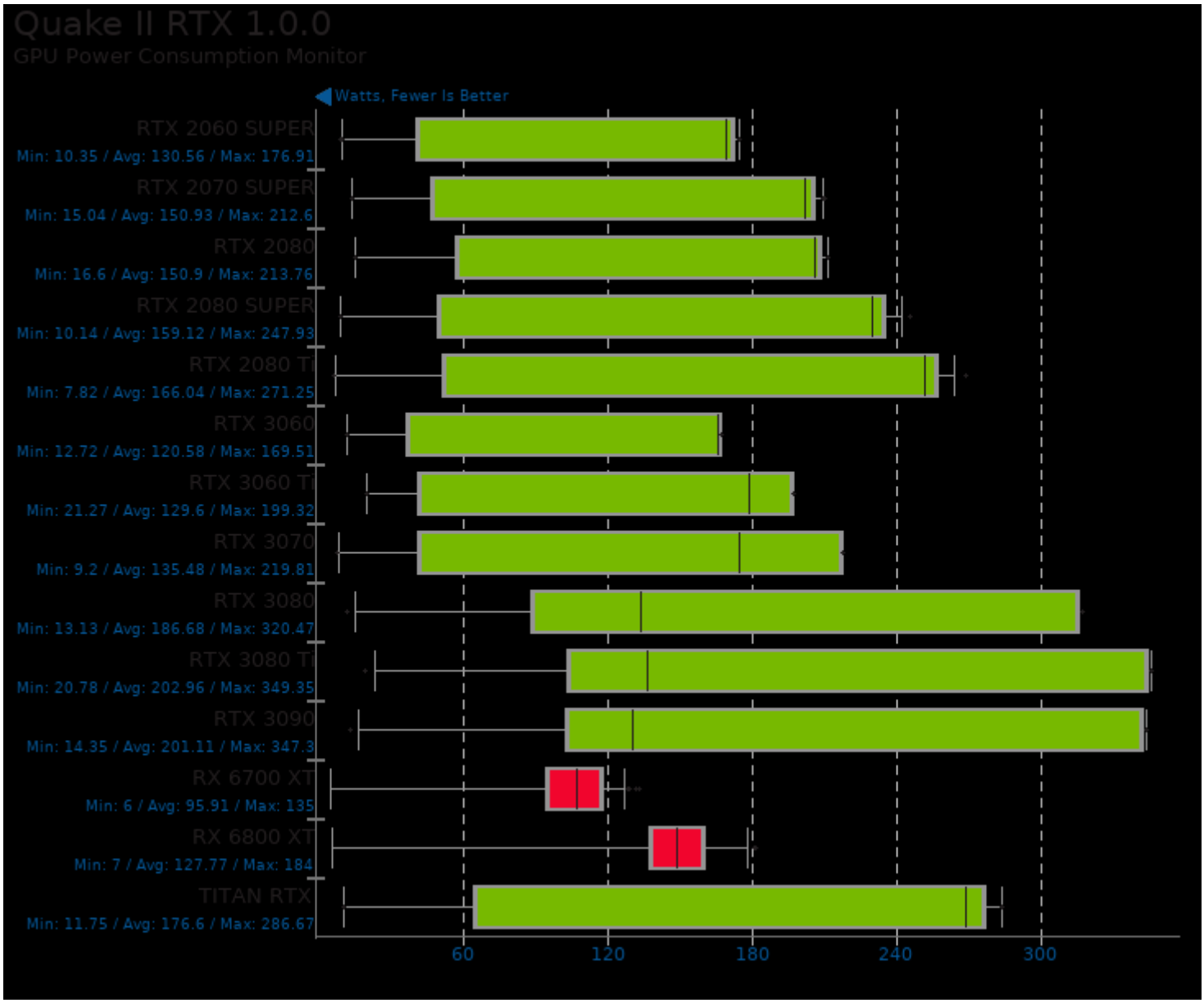

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.17 / Avg: 87.84 / Max: 179.17
RTX 2070 SUPER
Min: 15.16 / Avg: 97.42 / Max: 208.37
RTX 2080
Min: 16.88 / Avg: 98.91 / Max: 215.18
RTX 2080 SUPER
Min: 9.89 / Avg: 92.91 / Max: 226.57
RTX 2080 Ti
Min: 7.75 / Avg: 106.28 / Max: 263.56
RTX 3060
Min: 12.78 / Avg: 76.81 / Max: 164.41
RTX 3060 Ti
Min: 20.62 / Avg: 84.18 / Max: 199.38
RTX 3070
Min: 9.03 / Avg: 86.01 / Max: 219.38
RTX 3080
Min: 12.43 / Avg: 129.49 / Max: 317.51
RTX 3080 Ti
Min: 21.23 / Avg: 145.32 / Max: 344.82
RTX 3090
Min: 17.97 / Avg: 140.22 / Max: 345.13
RX 6700 XT
Min: 6 / Avg: 63.58 / Max: 95
RX 6800 XT
Min: 7 / Avg: 83.1 / Max: 137
TITAN RTX
Min: 11.06 / Avg: 113.62 / Max: 283.27
60
120
180
240
300

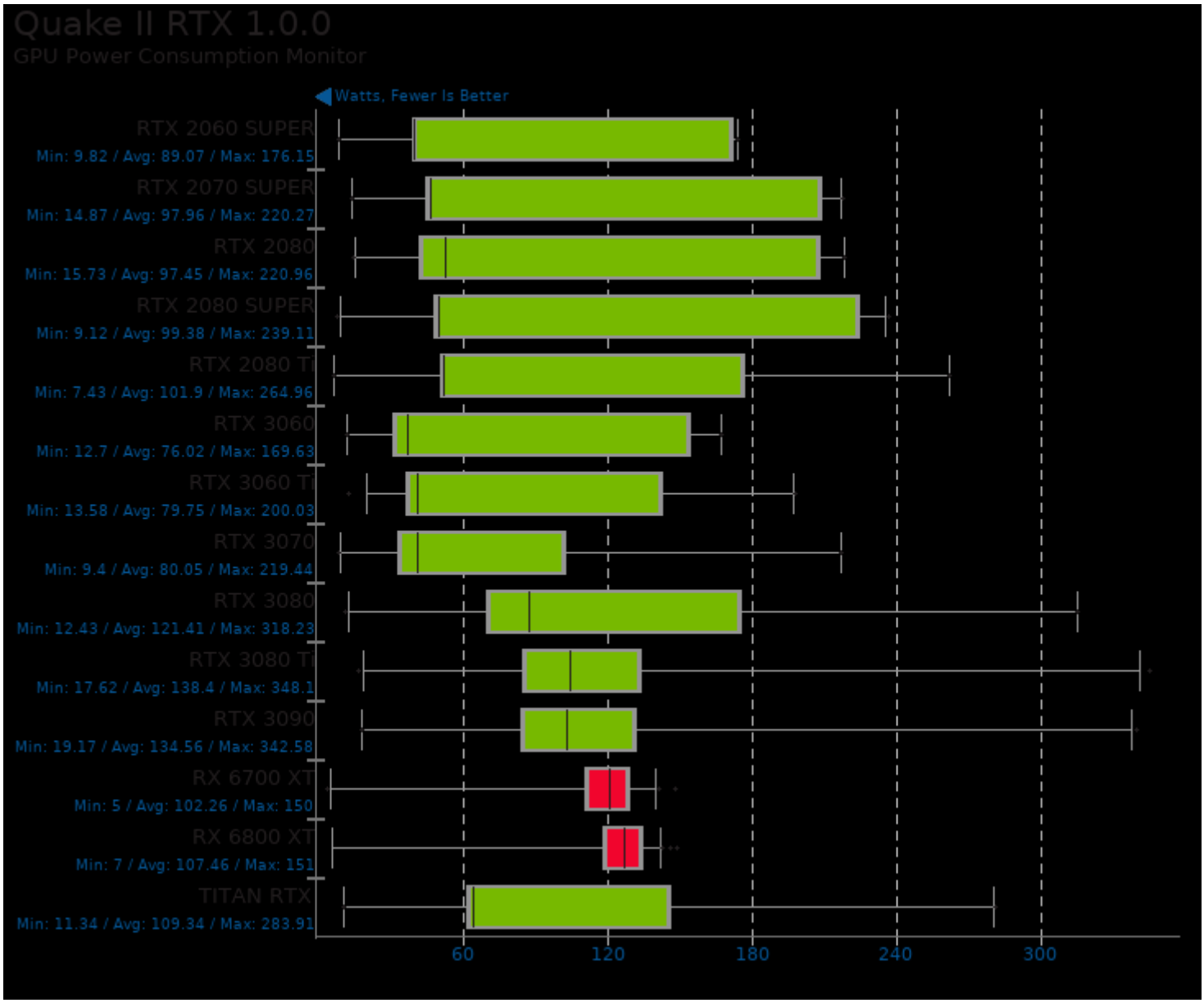

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.21 / Avg: 140.66 / Max: 178.22
RTX 2070 SUPER
Min: 15.03 / Avg: 167.92 / Max: 216.62
RTX 2080
Min: 15.64 / Avg: 169.15 / Max: 217.68
RTX 2080 SUPER
Min: 10.07 / Avg: 185.03 / Max: 253.01
RTX 2080 Ti
Min: 7.35 / Avg: 182.48 / Max: 265.24
RTX 3060
Min: 12.74 / Avg: 132.87 / Max: 169.46
RTX 3060 Ti
Min: 20.99 / Avg: 144.07 / Max: 198.66
RTX 3070
Min: 8.88 / Avg: 152.9 / Max: 219.7
RTX 3080
Min: 15.56 / Avg: 211.99 / Max: 320.19
RTX 3080 Ti
Min: 22.37 / Avg: 229.57 / Max: 349.78
RTX 3090
Min: 8.04 / Avg: 221.02 / Max: 348.11
RX 6700 XT
Min: 6 / Avg: 123.08 / Max: 170
RX 6800 XT
Min: 7 / Avg: 160.48 / Max: 239
TITAN RTX
Min: 10.26 / Avg: 198.63 / Max: 284.22
60
120
180
240
300


Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.4 / Avg: 110.17 / Max: 178.15
RTX 2070 SUPER
Min: 15.8 / Avg: 125.77 / Max: 218.89
RTX 2080
Min: 17.35 / Avg: 127.47 / Max: 218.83
RTX 2080 SUPER
Min: 10.26 / Avg: 134.43 / Max: 243.99
RTX 2080 Ti
Min: 8.15 / Avg: 134.17 / Max: 263.85
RTX 3060
Min: 13.49 / Avg: 101.66 / Max: 169.68
RTX 3060 Ti
Min: 21.71 / Avg: 108.06 / Max: 199.04
RTX 3070
Min: 9.27 / Avg: 112.67 / Max: 219.37
RTX 3080
Min: 14.68 / Avg: 159.5 / Max: 319.46
RTX 3080 Ti
Min: 17.25 / Avg: 174.34 / Max: 349.21
RTX 3090
Min: 14.84 / Avg: 170.74 / Max: 347.29
RX 6700 XT
Min: 6 / Avg: 62.59 / Max: 94
RX 6800 XT
Min: 7 / Avg: 84.18 / Max: 139
TITAN RTX
Min: 13.03 / Avg: 146.54 / Max: 287.62
60
120
180
240
300

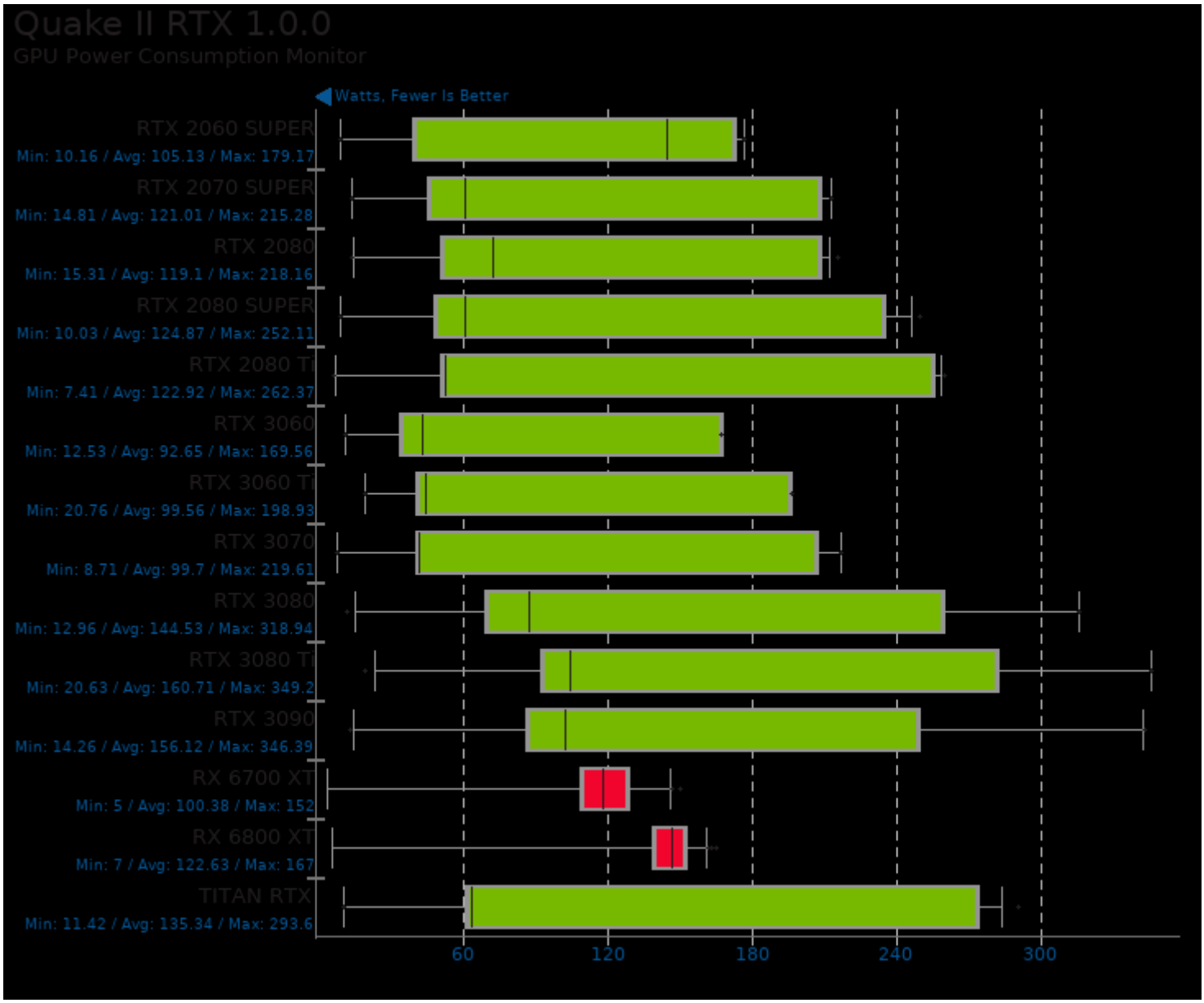

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.54 / Avg: 91.45 / Max: 178.44
RTX 2070 SUPER
Min: 15.19 / Avg: 102.86 / Max: 213.05
RTX 2080
Min: 16.64 / Avg: 105.97 / Max: 220.35
RTX 2080 SUPER
Min: 10.33 / Avg: 101.53 / Max: 233.85
RTX 2080 Ti
Min: 8.31 / Avg: 109.05 / Max: 268.72
RTX 3060
Min: 12.62 / Avg: 78.85 / Max: 169.6
RTX 3060 Ti
Min: 21.32 / Avg: 83.88 / Max: 199.65
RTX 3070
Min: 9.01 / Avg: 86.24 / Max: 219.3
RTX 3080
Min: 13 / Avg: 128.94 / Max: 318.52
RTX 3080 Ti
Min: 20.97 / Avg: 146.23 / Max: 345.86
RTX 3090
Min: 14.44 / Avg: 141.98 / Max: 346.27
RX 6700 XT
Min: 6 / Avg: 94.28 / Max: 136
RX 6800 XT
Min: 7 / Avg: 124.55 / Max: 182
TITAN RTX
Min: 12.45 / Avg: 119.59 / Max: 285.52
60
120
180
240
300

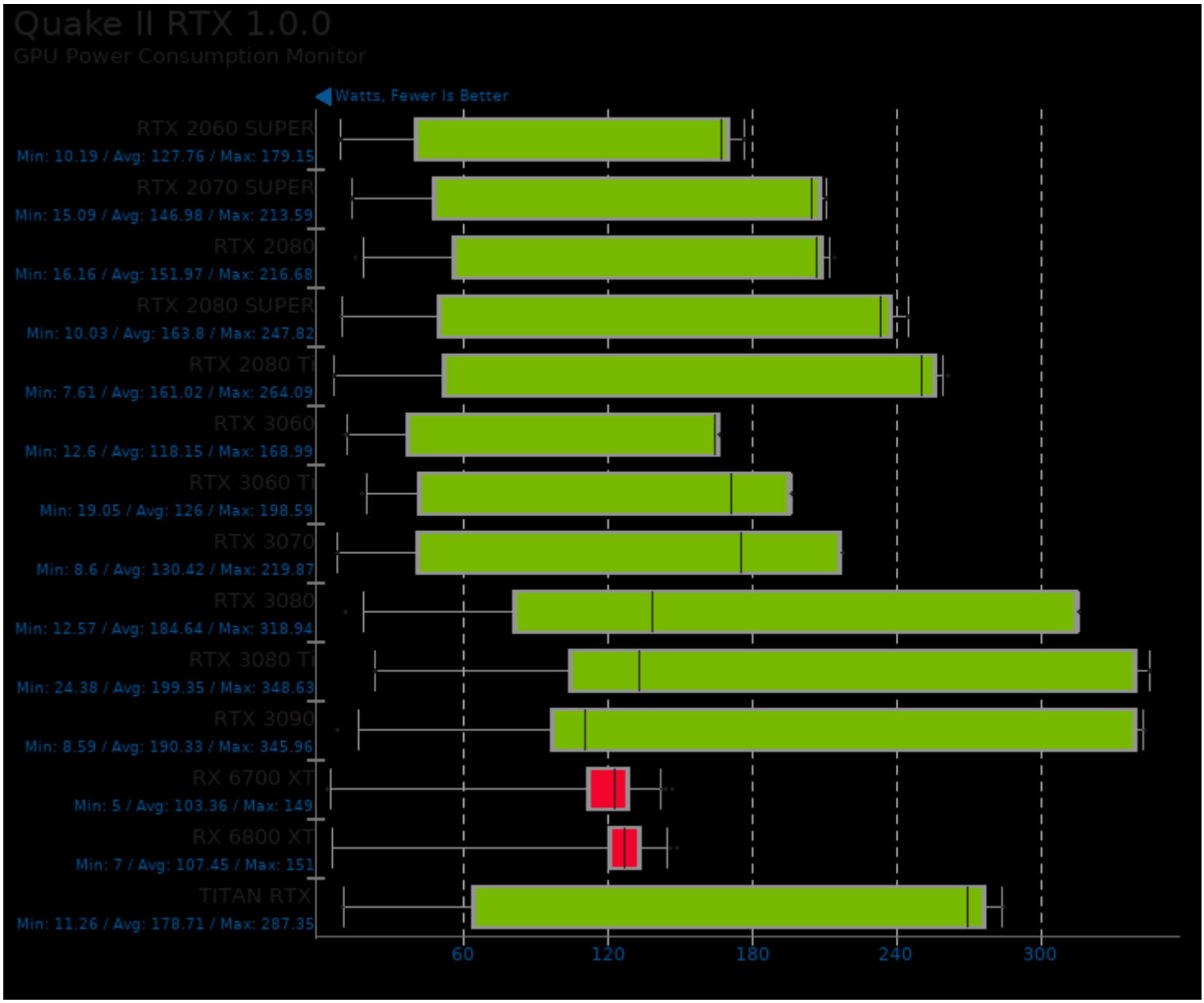

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.99 / Avg: 107.36 / Max: 178.7
RTX 2070 SUPER
Min: 15.07 / Avg: 121.69 / Max: 217.2
RTX 2080
Min: 16.07 / Avg: 124.76 / Max: 217.89
RTX 2080 SUPER
Min: 10.14 / Avg: 128.2 / Max: 247.2
RTX 2080 Ti
Min: 8.12 / Avg: 132.01 / Max: 266.57
RTX 3060
Min: 12.75 / Avg: 96.62 / Max: 169.79
RTX 3060 Ti
Min: 20.9 / Avg: 102.61 / Max: 199.94
RTX 3070
Min: 8.97 / Avg: 104.7 / Max: 219.48
RTX 3080
Min: 15.09 / Avg: 150.46 / Max: 319.2
RTX 3080 Ti
Min: 18.96 / Avg: 166.47 / Max: 349.68
RTX 3090
Min: 13.42 / Avg: 162.98 / Max: 347.94
RX 6700 XT
Min: 5 / Avg: 96.75 / Max: 141
RX 6800 XT
Min: 7 / Avg: 120.68 / Max: 169
TITAN RTX
Min: 11.82 / Avg: 139.58 / Max: 286.47
60
120
180
240
300

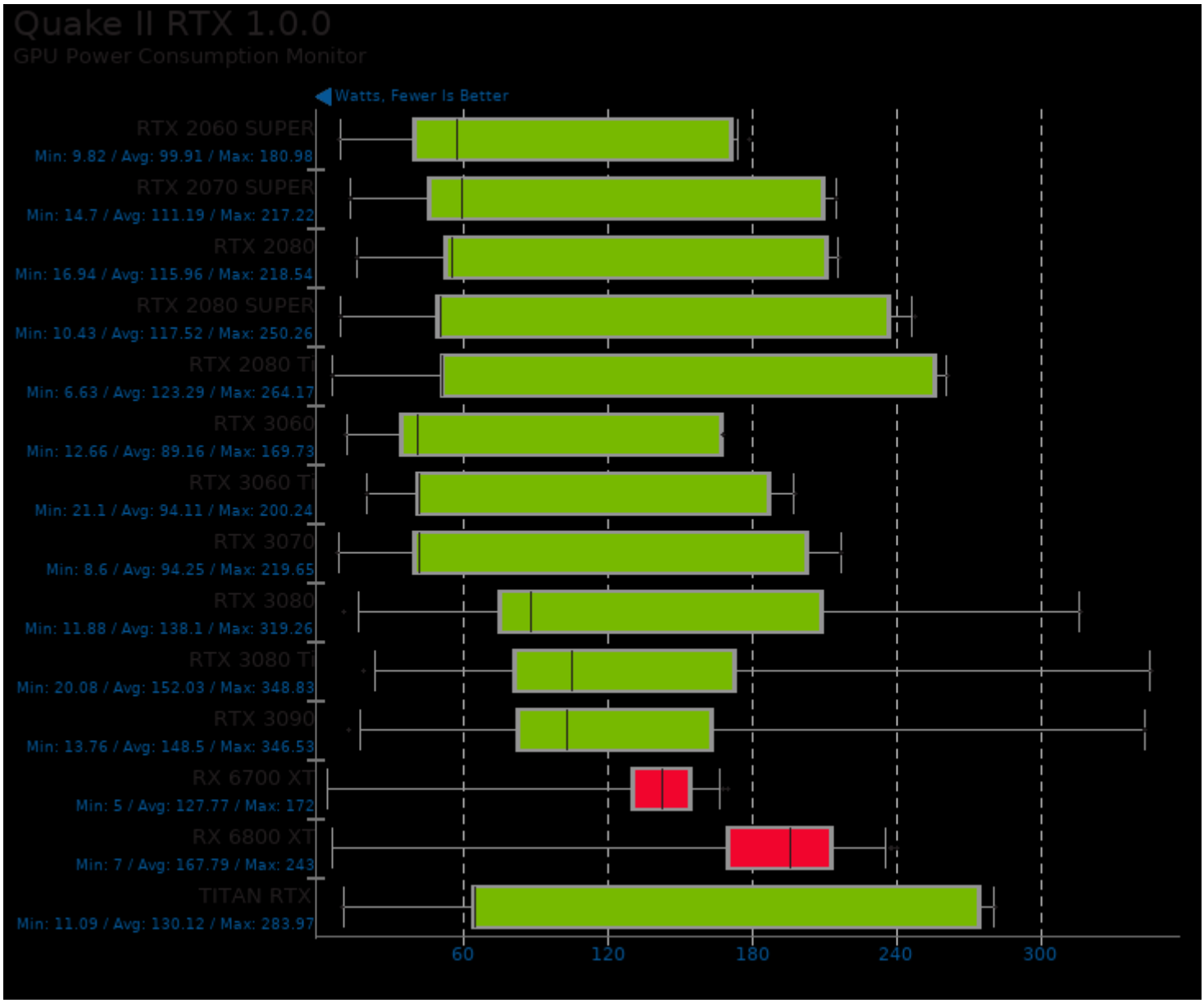

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.35 / Avg: 130.56 / Max: 176.91
RTX 2070 SUPER
Min: 15.04 / Avg: 150.93 / Max: 212.6
RTX 2080
Min: 16.6 / Avg: 150.9 / Max: 213.76
RTX 2080 SUPER
Min: 10.14 / Avg: 159.12 / Max: 247.93
RTX 2080 Ti
Min: 7.82 / Avg: 166.04 / Max: 271.25
RTX 3060
Min: 12.72 / Avg: 120.58 / Max: 169.51
RTX 3060 Ti
Min: 21.27 / Avg: 129.6 / Max: 199.32
RTX 3070
Min: 9.2 / Avg: 135.48 / Max: 219.81
RTX 3080
Min: 13.13 / Avg: 186.68 / Max: 320.47
RTX 3080 Ti
Min: 20.78 / Avg: 202.96 / Max: 349.35
RTX 3090
Min: 14.35 / Avg: 201.11 / Max: 347.3
RX 6700 XT
Min: 6 / Avg: 95.91 / Max: 135
RX 6800 XT
Min: 7 / Avg: 127.77 / Max: 184
TITAN RTX
Min: 11.75 / Avg: 176.6 / Max: 286.67
60
120
180
240
300

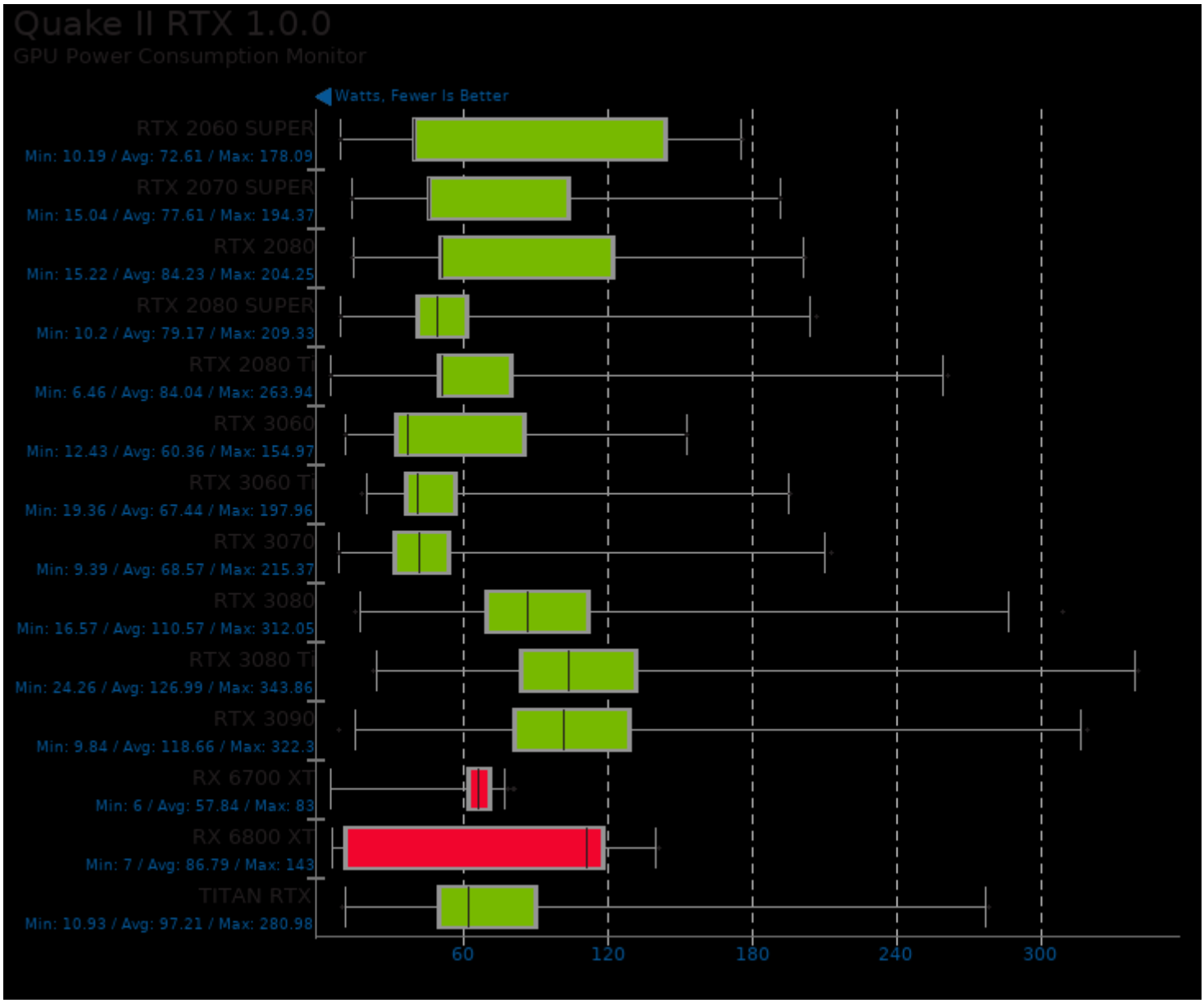

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.82 / Avg: 89.07 / Max: 176.15
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Min: 14.87 / Avg: 97.96 / Max: 220.27
RTX 2080
Min: 15.73 / Avg: 97.45 / Max: 220.96
RTX 2080 SUPER
Min: 9.12 / Avg: 99.38 / Max: 239.11
RTX 2080 Ti
Min: 7.43 / Avg: 101.9 / Max: 264.96
RTX 3060
Min: 12.7 / Avg: 76.02 / Max: 169.63
RTX 3060 Ti
Min: 13.58 / Avg: 79.75 / Max: 200.03
RTX 3070
Min: 9.4 / Avg: 80.05 / Max: 219.44
RTX 3080
Min: 12.43 / Avg: 121.41 / Max: 318.23
RTX 3080 Ti
Min: 17.62 / Avg: 138.4 / Max: 348.1
RTX 3090
Min: 19.17 / Avg: 134.56 / Max: 342.58
RX 6700 XT
Min: 5 / Avg: 102.26 / Max: 150
RX 6800 XT
Min: 7 / Avg: 107.46 / Max: 151
TITAN RTX
Min: 11.34 / Avg: 109.34 / Max: 283.91
60
120
180
240
300

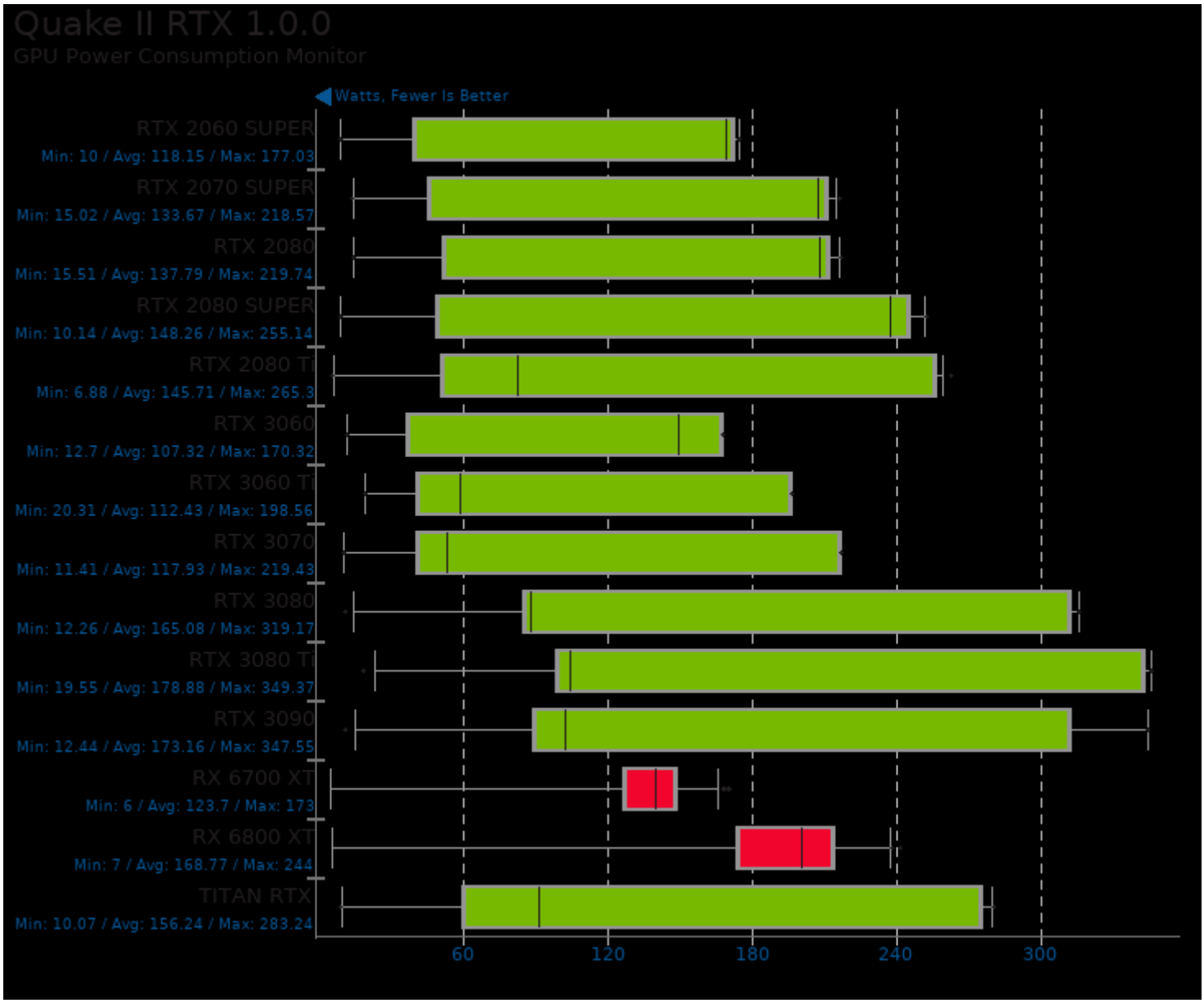
Vulkan Ray-Tracing GPUs

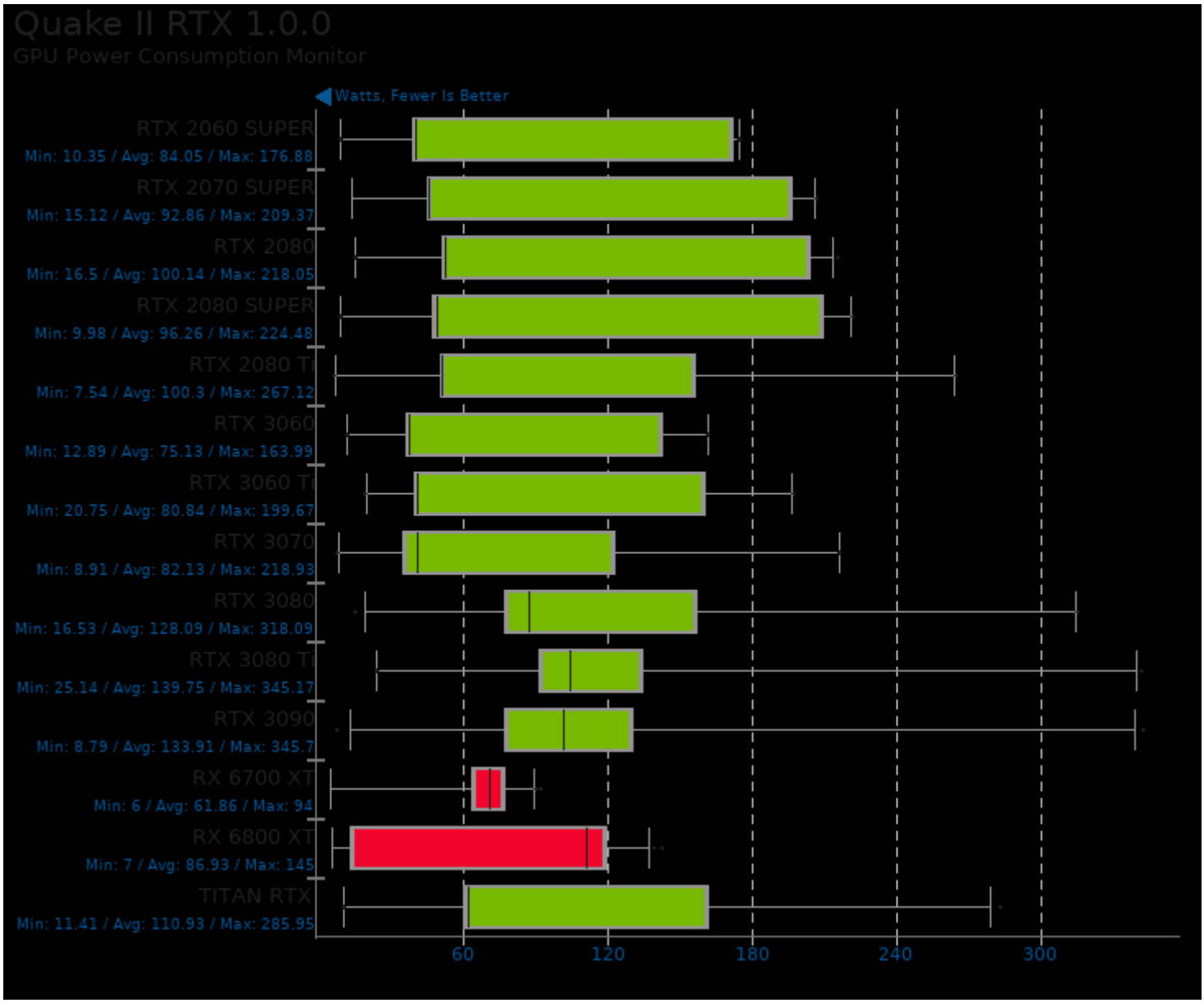


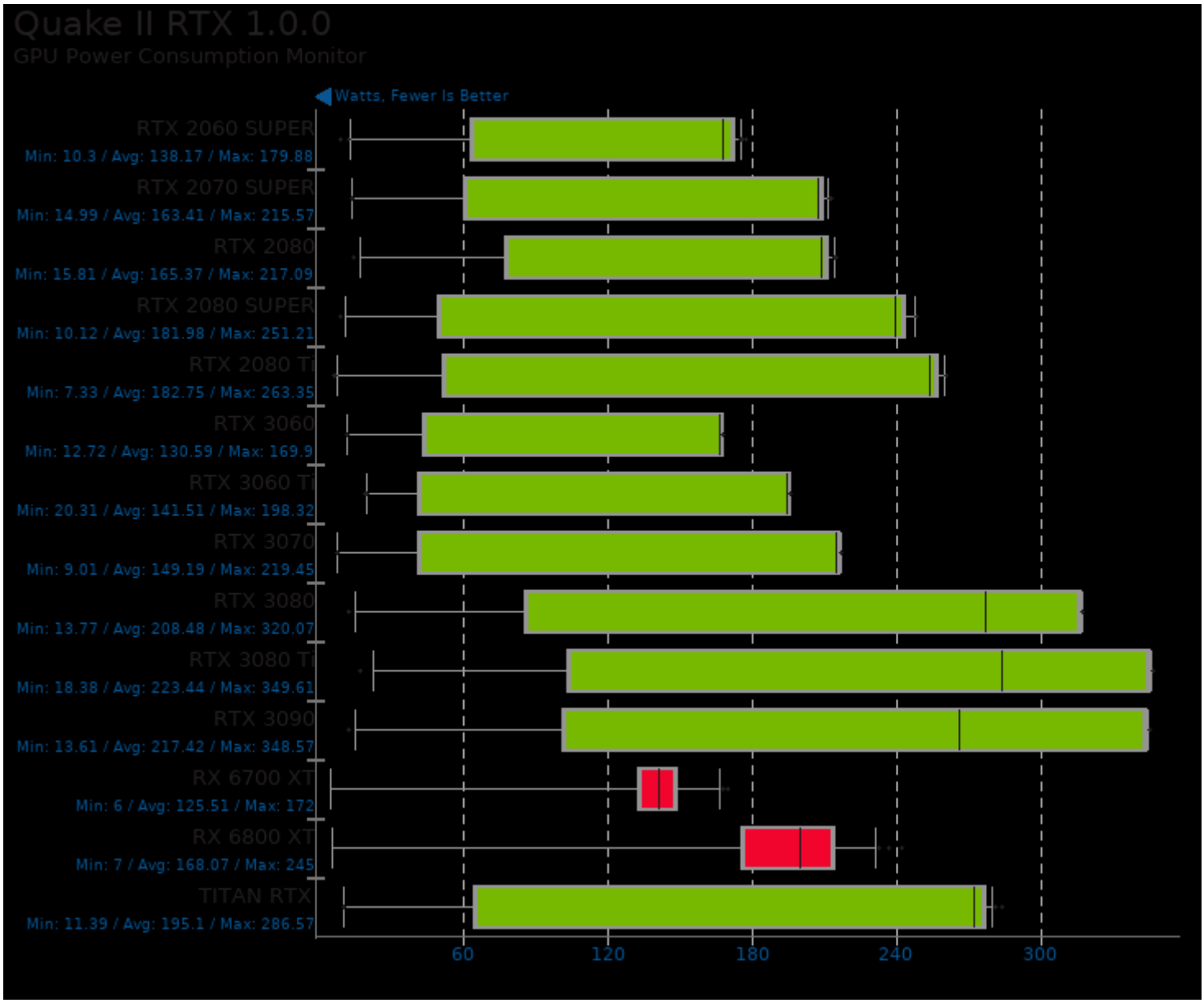

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.19 / Avg: 127.76 / Max: 179.15
RTX 2070 SUPER
Min: 15.09 / Avg: 146.98 / Max: 213.59
RTX 2080
Min: 16.16 / Avg: 151.97 / Max: 216.68
RTX 2080 SUPER
Min: 10.03 / Avg: 163.8 / Max: 247.82
RTX 2080 Ti
Min: 7.61 / Avg: 161.02 / Max: 264.09
RTX 3060
Min: 12.6 / Avg: 118.15 / Max: 168.99
RTX 3060 Ti
Min: 19.05 / Avg: 126 / Max: 198.59
RTX 3070
Min: 8.6 / Avg: 130.42 / Max: 219.87
RTX 3080
Min: 12.57 / Avg: 184.64 / Max: 318.94
RTX 3080 Ti
Min: 24.38 / Avg: 199.35 / Max: 348.63
RTX 3090
Min: 8.59 / Avg: 190.33 / Max: 345.96
RX 6700 XT
Min: 5 / Avg: 103.36 / Max: 149
RX 6800 XT
Min: 7 / Avg: 107.45 / Max: 151
TITAN RTX
Min: 11.26 / Avg: 178.71 / Max: 287.35
60
120
180
240
300


Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.82 / Avg: 99.91 / Max: 180.98
RTX 2070 SUPER
Min: 14.7 / Avg: 111.19 / Max: 217.22
RTX 2080
Min: 16.94 / Avg: 115.96 / Max: 218.54
RTX 2080 SUPER
Min: 10.43 / Avg: 117.52 / Max: 250.26
RTX 2080 Ti
Min: 6.63 / Avg: 123.29 / Max: 264.17
RTX 3060
Min: 12.66 / Avg: 89.16 / Max: 169.73
RTX 3060 Ti
Min: 21.1 / Avg: 94.11 / Max: 200.24
RTX 3070
Min: 8.6 / Avg: 94.25 / Max: 219.65
RTX 3080
Min: 11.88 / Avg: 138.1 / Max: 319.26
RTX 3080 Ti
Min: 20.08 / Avg: 152.03 / Max: 348.83
RTX 3090
Min: 13.76 / Avg: 148.5 / Max: 346.53
RX 6700 XT
Min: 5 / Avg: 127.77 / Max: 172
RX 6800 XT
Min: 7 / Avg: 167.79 / Max: 243
TITAN RTX
Min: 11.09 / Avg: 130.12 / Max: 283.97
60
120
180
240
300

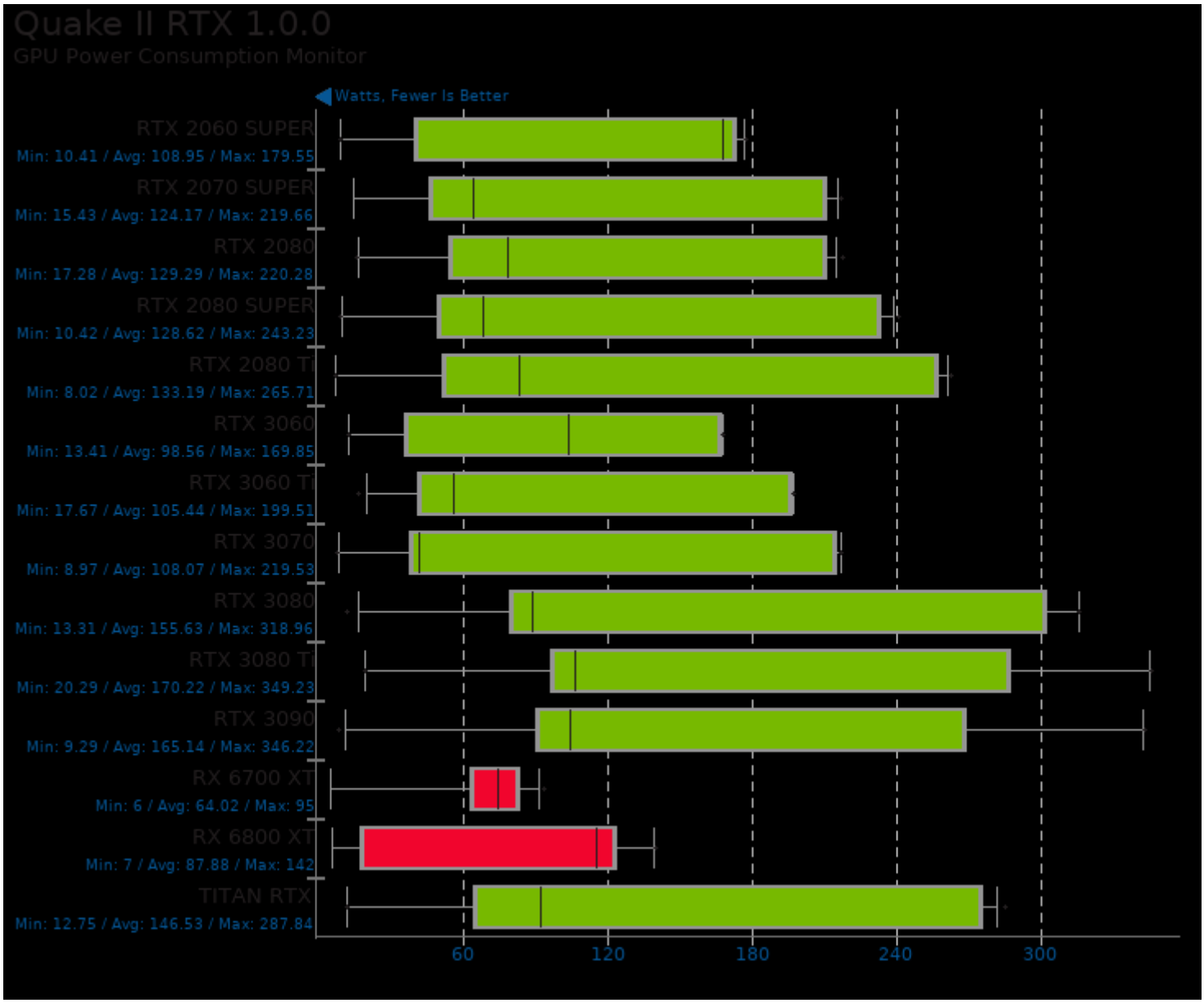

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.19 / Avg: 72.61 / Max: 178.09
RTX 2070 SUPER
Min: 15.04 / Avg: 77.61 / Max: 194.37
RTX 2080
Min: 15.22 / Avg: 84.23 / Max: 204.25
RTX 2080 SUPER
Min: 10.2 / Avg: 79.17 / Max: 209.33
RTX 2080 Ti
Min: 6.46 / Avg: 84.04 / Max: 263.94
RTX 3060
Min: 12.43 / Avg: 60.36 / Max: 154.97
RTX 3060 Ti
Min: 19.36 / Avg: 67.44 / Max: 197.96
RTX 3070
Min: 9.39 / Avg: 68.57 / Max: 215.37
RTX 3080
Min: 16.57 / Avg: 110.57 / Max: 312.05
RTX 3080 Ti
Min: 24.26 / Avg: 126.99 / Max: 343.86
RTX 3090
Min: 9.84 / Avg: 118.66 / Max: 322.3
RX 6700 XT
Min: 6 / Avg: 57.84 / Max: 83
RX 6800 XT
Min: 7 / Avg: 86.79 / Max: 143
TITAN RTX
Min: 10.93 / Avg: 97.21 / Max: 280.98
60
120
180
240
300

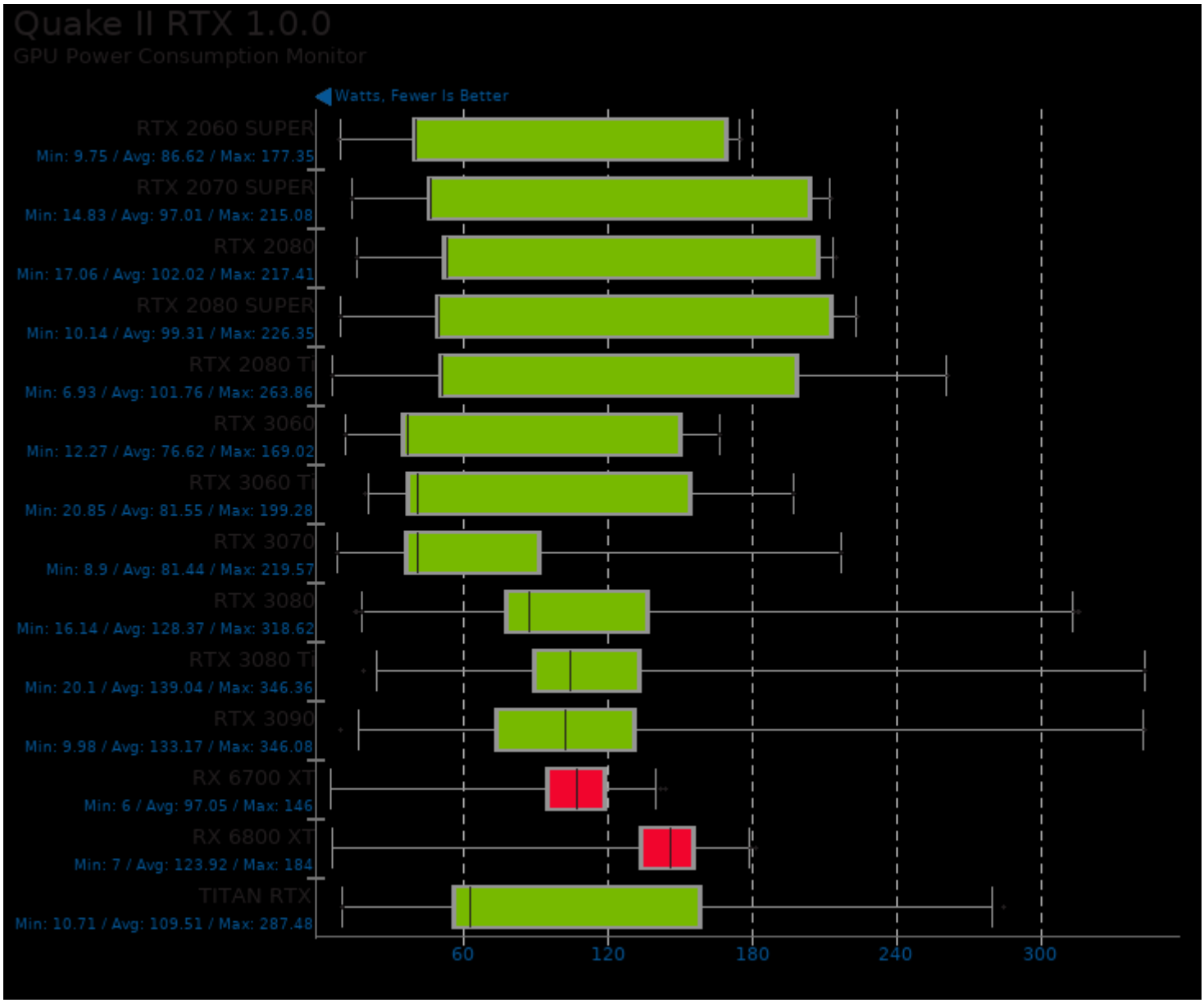

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10 / Avg: 118.15 / Max: 177.03
RTX 2070 SUPER
Min: 15.02 / Avg: 133.67 / Max: 218.57
RTX 2080
Min: 15.51 / Avg: 137.79 / Max: 219.74
RTX 2080 SUPER
Min: 10.14 / Avg: 148.26 / Max: 255.14
RTX 2080 Ti
Min: 6.88 / Avg: 145.71 / Max: 265.3
RTX 3060
Min: 12.7 / Avg: 107.32 / Max: 170.32
RTX 3060 Ti
Min: 20.31 / Avg: 112.43 / Max: 198.56
RTX 3070
Min: 11.41 / Avg: 117.93 / Max: 219.43
RTX 3080
Min: 12.26 / Avg: 165.08 / Max: 319.17
RTX 3080 Ti
Min: 19.55 / Avg: 178.88 / Max: 349.37
RTX 3090
Min: 12.44 / Avg: 173.16 / Max: 347.55
RX 6700 XT
Min: 6 / Avg: 123.7 / Max: 173
RX 6800 XT
Min: 7 / Avg: 168.77 / Max: 244
TITAN RTX
Min: 10.07 / Avg: 156.24 / Max: 283.24
60
120
180
240
300

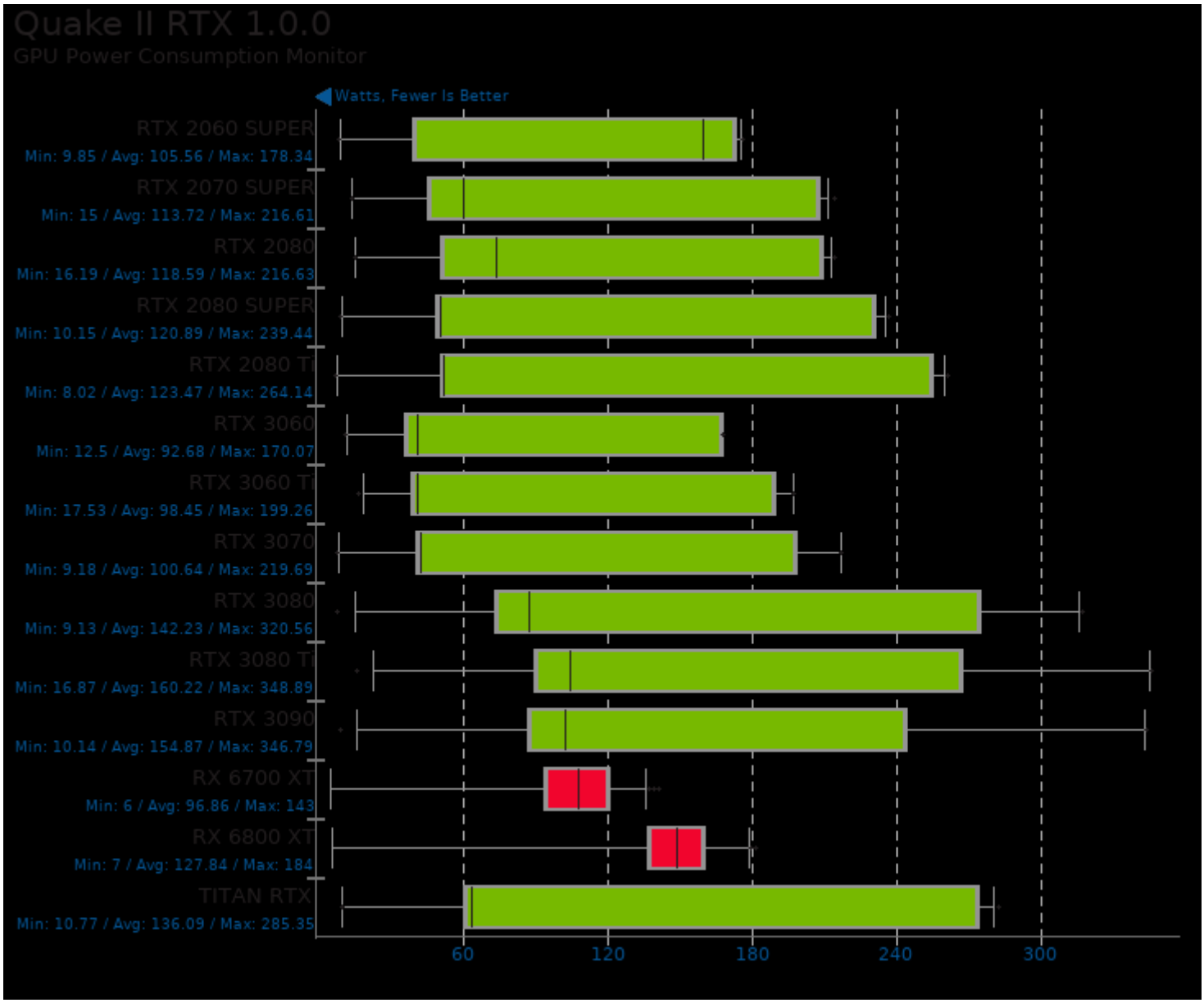

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.35 / Avg: 84.05 / Max: 176.88
RTX 2070 SUPER
Min: 15.12 / Avg: 92.86 / Max: 209.37
RTX 2080
Min: 16.5 / Avg: 100.14 / Max: 218.05
RTX 2080 SUPER
Min: 9.98 / Avg: 96.26 / Max: 224.48
RTX 2080 Ti
Min: 7.54 / Avg: 100.3 / Max: 267.12
RTX 3060
Min: 12.89 / Avg: 75.13 / Max: 163.99
RTX 3060 Ti
Min: 20.75 / Avg: 80.84 / Max: 199.67
RTX 3070
Min: 8.91 / Avg: 82.13 / Max: 218.93
RTX 3080
Min: 16.53 / Avg: 128.09 / Max: 318.09
RTX 3080 Ti
Min: 25.14 / Avg: 139.75 / Max: 345.17
RTX 3090
Min: 8.79 / Avg: 133.91 / Max: 345.7
RX 6700 XT
Min: 6 / Avg: 61.86 / Max: 94
RX 6800 XT
Min: 7 / Avg: 86.93 / Max: 145
TITAN RTX
Min: 11.41 / Avg: 110.93 / Max: 285.95
60
120
180
240
300

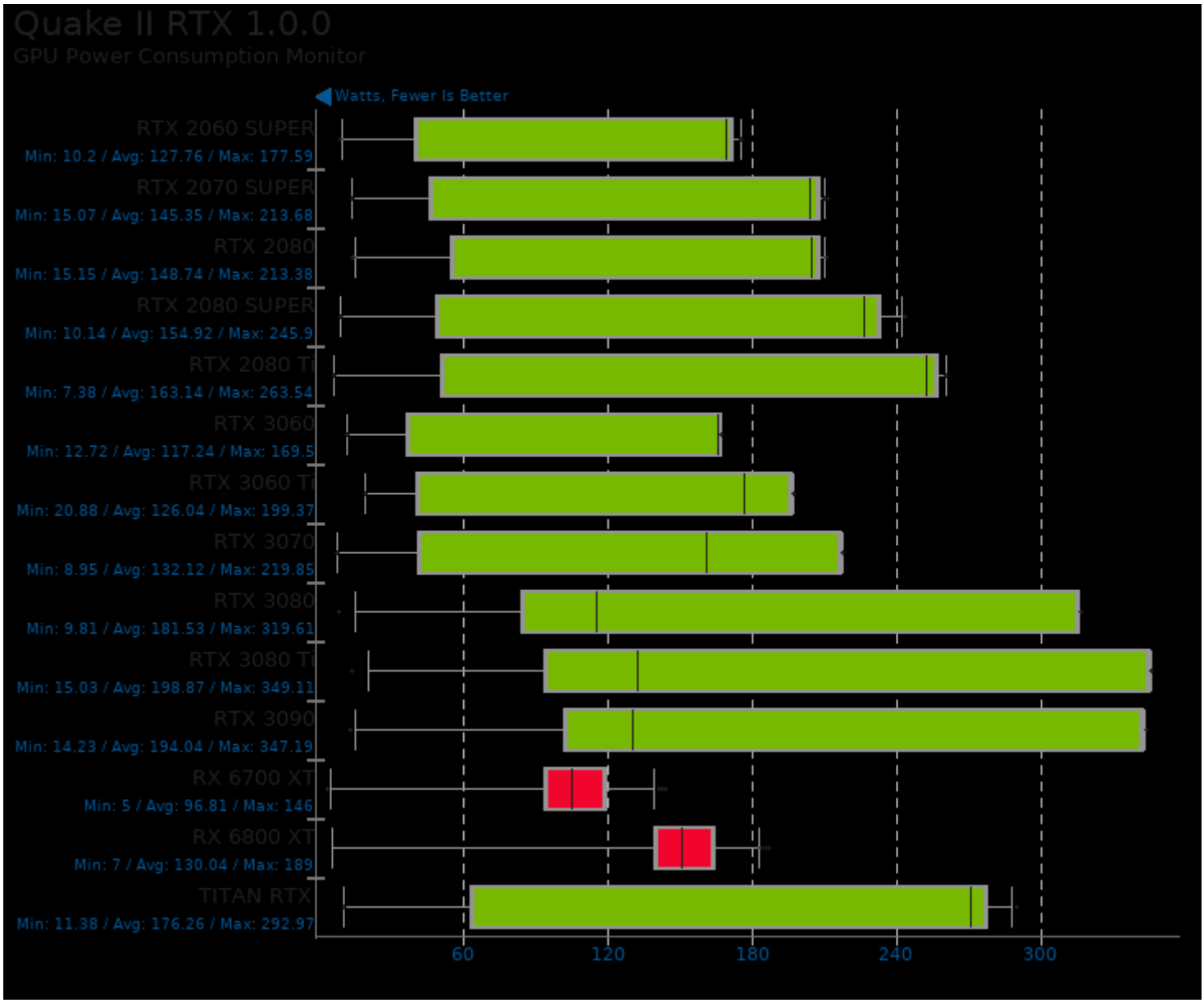

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.3 / Avg: 138.17 / Max: 179.88
RTX 2070 SUPER
Min: 14.99 / Avg: 163.41 / Max: 215.57
RTX 2080
Min: 15.81 / Avg: 165.37 / Max: 217.09
RTX 2080 SUPER
Min: 10.12 / Avg: 181.98 / Max: 251.21
RTX 2080 Ti
Min: 7.33 / Avg: 182.75 / Max: 263.35
RTX 3060
Min: 12.72 / Avg: 130.59 / Max: 169.9
RTX 3060 Ti
Min: 20.31 / Avg: 141.51 / Max: 198.32
RTX 3070
Min: 9.01 / Avg: 149.19 / Max: 219.45
RTX 3080
Min: 13.77 / Avg: 208.48 / Max: 320.07
RTX 3080 Ti
Min: 18.38 / Avg: 223.44 / Max: 349.61
RTX 3090
Min: 13.61 / Avg: 217.42 / Max: 348.57
RX 6700 XT
Min: 6 / Avg: 125.51 / Max: 172
RX 6800 XT
Min: 7 / Avg: 168.07 / Max: 245
TITAN RTX
Min: 11.39 / Avg: 195.1 / Max: 286.57
60
120
180
240
300

Vulkan Ray-Tracing GPUs

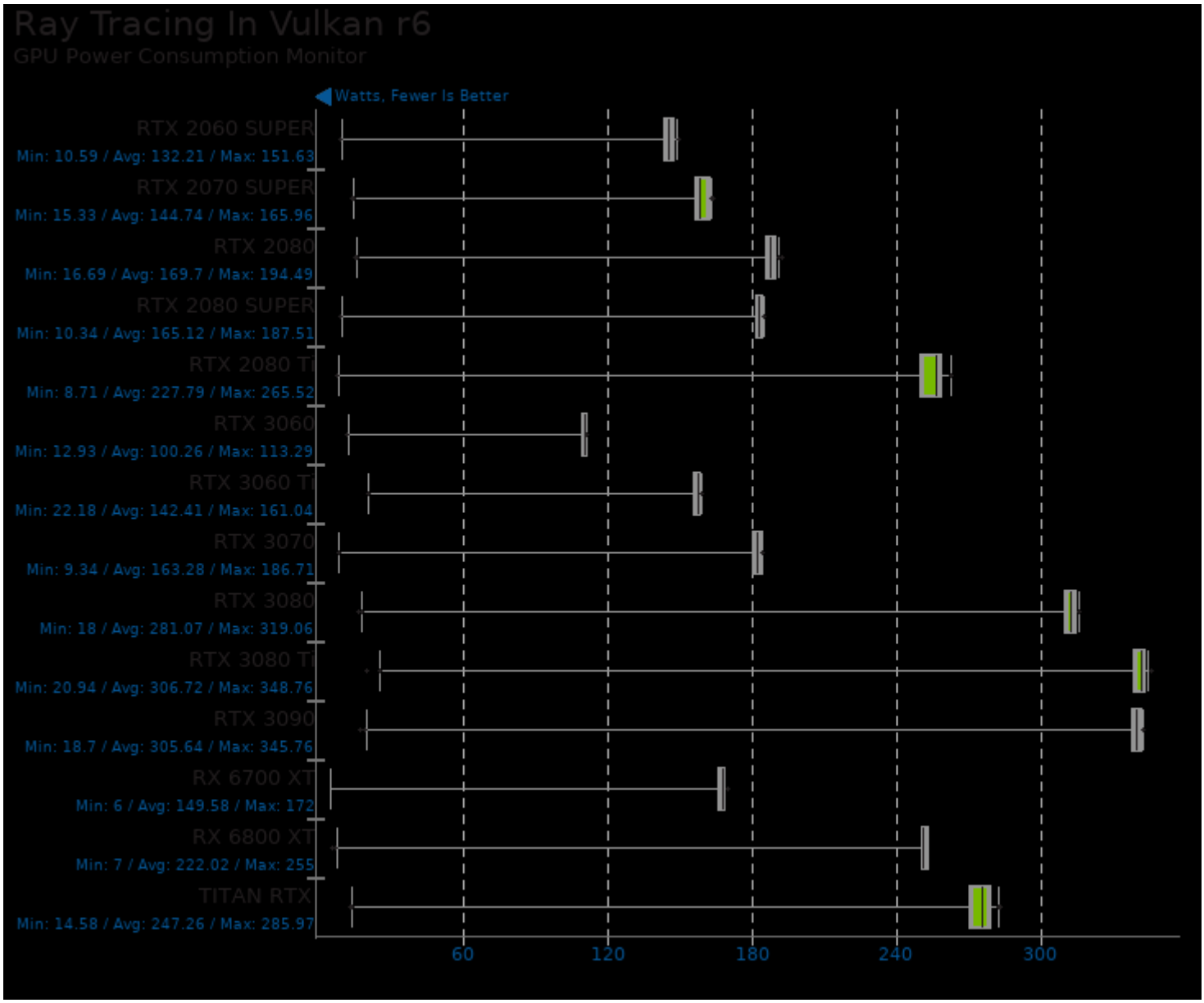



Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.75 / Avg: 86.62 / Max: 177.35
RTX 2070 SUPER
Min: 14.83 / Avg: 97.01 / Max: 215.08
RTX 2080
Min: 17.06 / Avg: 102.02 / Max: 217.41
RTX 2080 SUPER
Min: 10.14 / Avg: 99.31 / Max: 226.35
RTX 2080 Ti
Min: 6.93 / Avg: 101.76 / Max: 263.86
RTX 3060
Min: 12.27 / Avg: 76.62 / Max: 169.02
RTX 3060 Ti
Min: 20.85 / Avg: 81.55 / Max: 199.28
RTX 3070
Min: 8.9 / Avg: 81.44 / Max: 219.57
RTX 3080
Min: 16.14 / Avg: 128.37 / Max: 318.62
RTX 3080 Ti
Min: 20.1 / Avg: 139.04 / Max: 346.36
RTX 3090
Min: 9.98 / Avg: 133.17 / Max: 346.08
RX 6700 XT
Min: 6 / Avg: 97.05 / Max: 146
RX 6800 XT
Min: 7 / Avg: 123.92 / Max: 184
TITAN RTX
Min: 10.71 / Avg: 109.51 / Max: 287.48
60
120
180
240
300

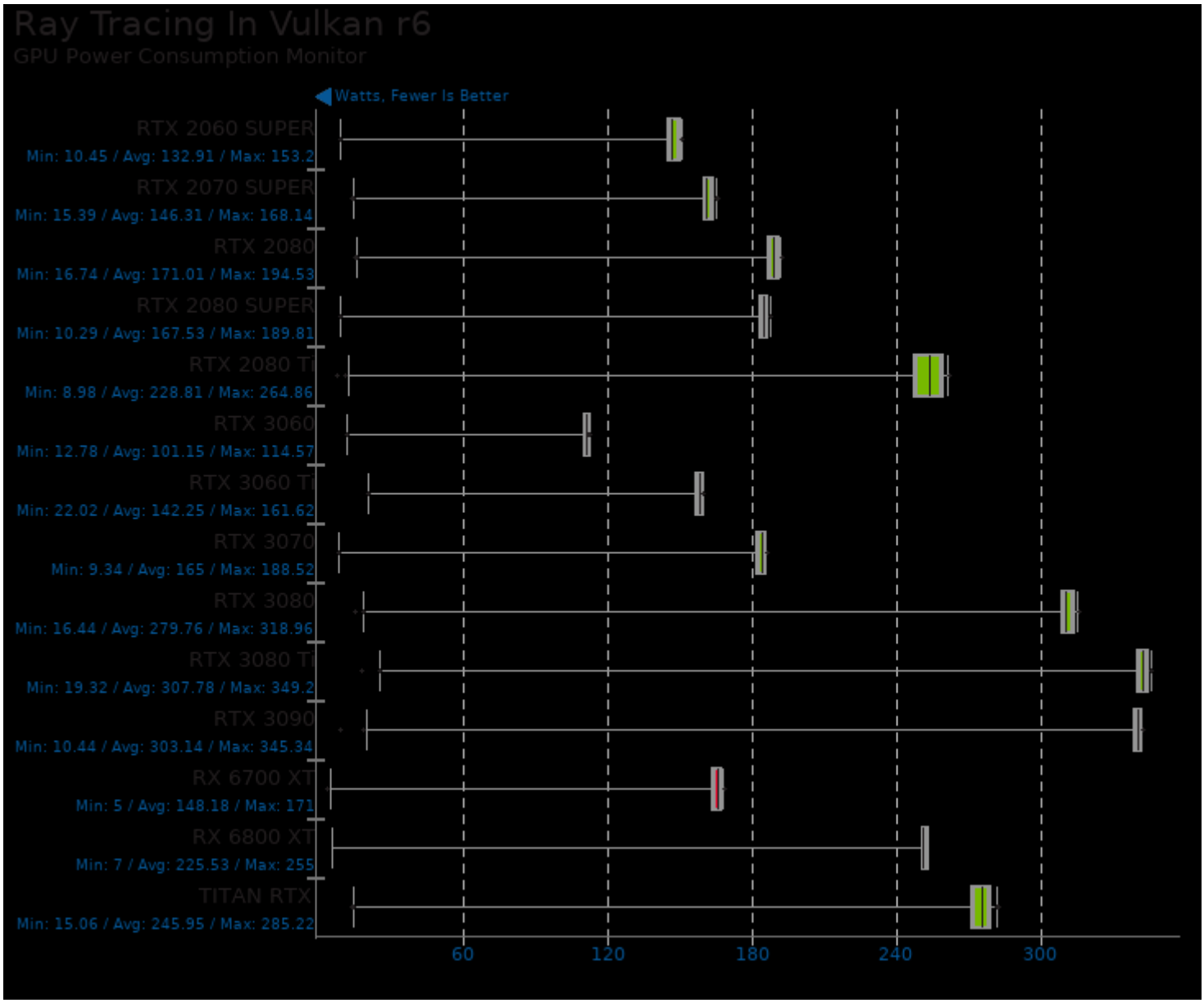

Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 9.85 / Avg: 105.56 / Max: 178.34
RTX 2070 SUPER
Min: 15 / Avg: 113.72 / Max: 216.61
RTX 2080
Min: 16.19 / Avg: 118.59 / Max: 216.63
RTX 2080 SUPER
Min: 10.15 / Avg: 120.89 / Max: 239.44
RTX 2080 Ti
Min: 8.02 / Avg: 123.47 / Max: 264.14
RTX 3060
Min: 12.5 / Avg: 92.68 / Max: 170.07
RTX 3060 Ti
Min: 17.53 / Avg: 98.45 / Max: 199.26
RTX 3070
Min: 9.18 / Avg: 100.64 / Max: 219.69
RTX 3080
Min: 9.13 / Avg: 142.23 / Max: 320.56
RTX 3080 Ti
Min: 16.87 / Avg: 160.22 / Max: 348.89
RTX 3090
Min: 10.14 / Avg: 154.87 / Max: 346.79
RX 6700 XT
Min: 6 / Avg: 96.86 / Max: 143
RX 6800 XT
Min: 7 / Avg: 127.84 / Max: 184
TITAN RTX
Min: 10.77 / Avg: 136.09 / Max: 285.35
60
120
180
240
300


Quake II RTX 1.0.0
GPU Power Consumption Monitor
Watts, Fewer Is Better
RTX 2060 SUPER
Min: 10.2 / Avg: 127.76 / Max: 177.59
RTX 2070 SUPER
Min: 15.07 / Avg: 145.35 / Max: 213.68
RTX 2080
Min: 15.15 / Avg: 148.74 / Max: 213.38
RTX 2080 SUPER
Min: 10.14 / Avg: 154.92 / Max: 245.9
RTX 2080 Ti
Min: 7.38 / Avg: 163.14 / Max: 263.54
RTX 3060
Min: 12.72 / Avg: 117.24 / Max: 169.5
RTX 3060 Ti
Min: 20.88 / Avg: 126.04 / Max: 199.37
RTX 3070
Min: 8.95 / Avg: 132.12 / Max: 219.85
RTX 3080
Min: 9.81 / Avg: 181.53 / Max: 319.61
RTX 3080 Ti
Min: 15.03 / Avg: 198.87 / Max: 349.11
RTX 3090
Min: 14.23 / Avg: 194.04 / Max: 347.19
RX 6700 XT
Min: 5 / Avg: 96.81 / Max: 146
RX 6800 XT
Min: 7 / Avg: 130.04 / Max: 189
TITAN RTX
Min: 11.38 / Avg: 176.26 / Max: 292.97
60
120
180
240
300

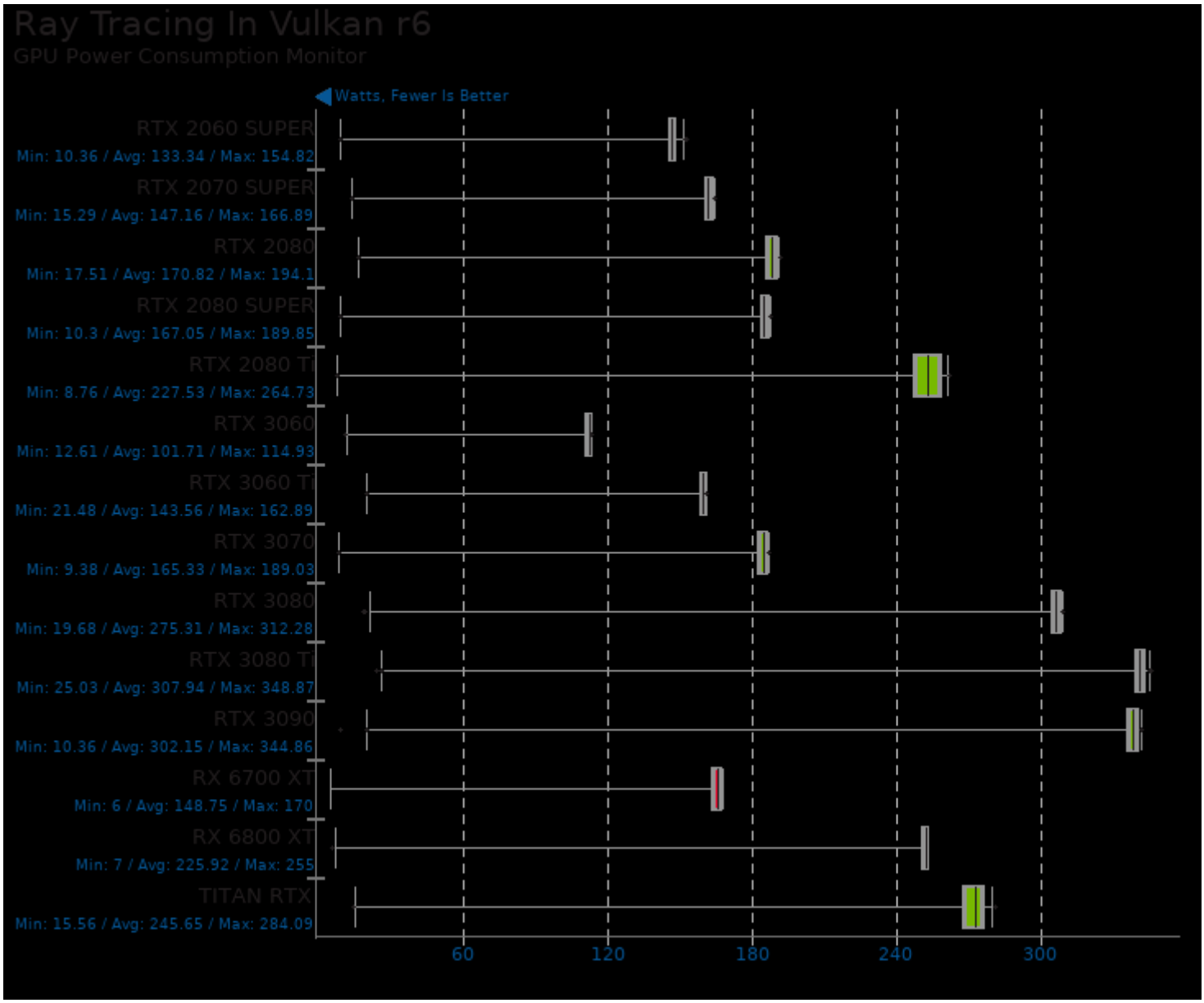
Vulkan Ray-Tracing GPUs



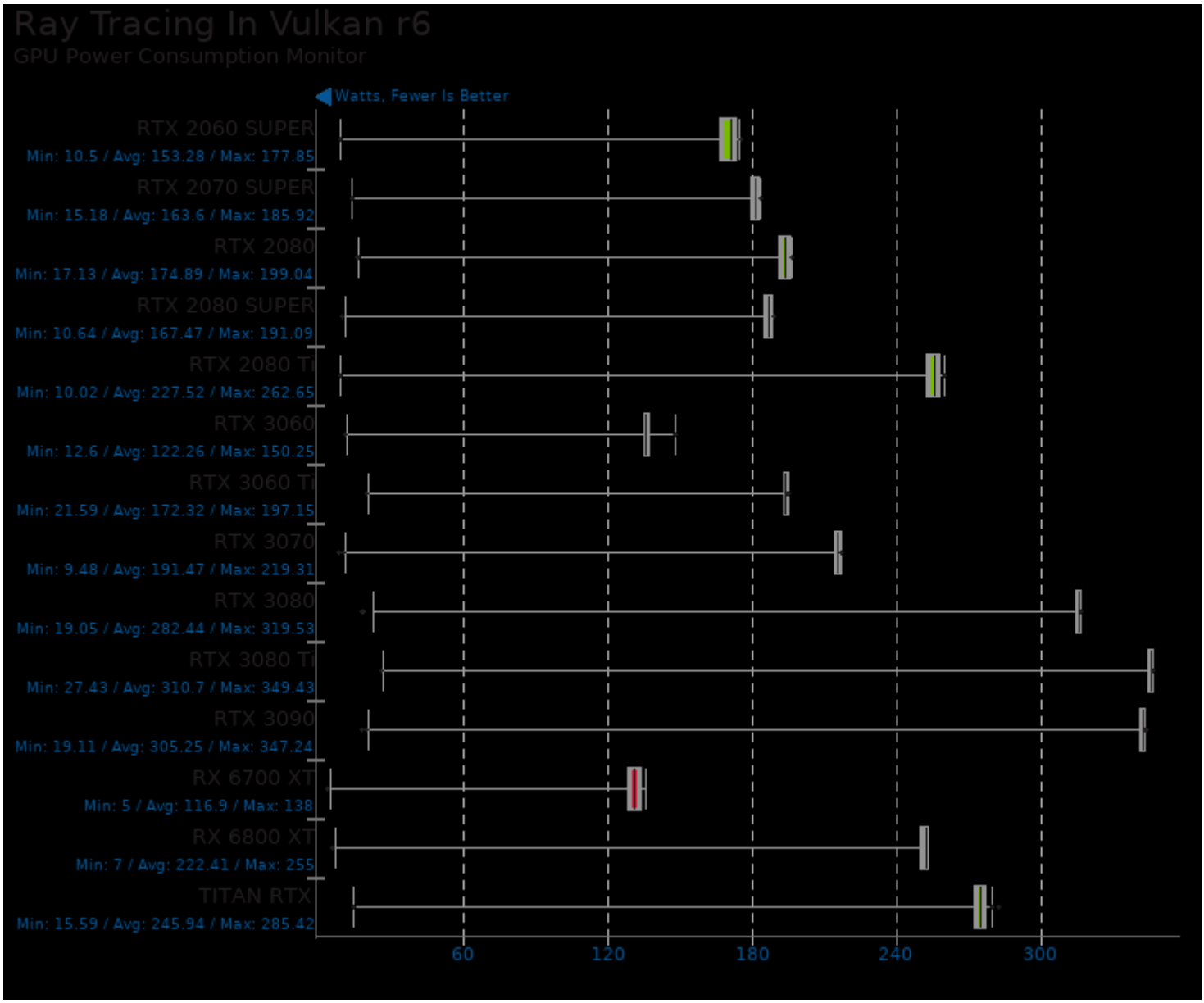
Vulkan Ray-Tracing GPUs



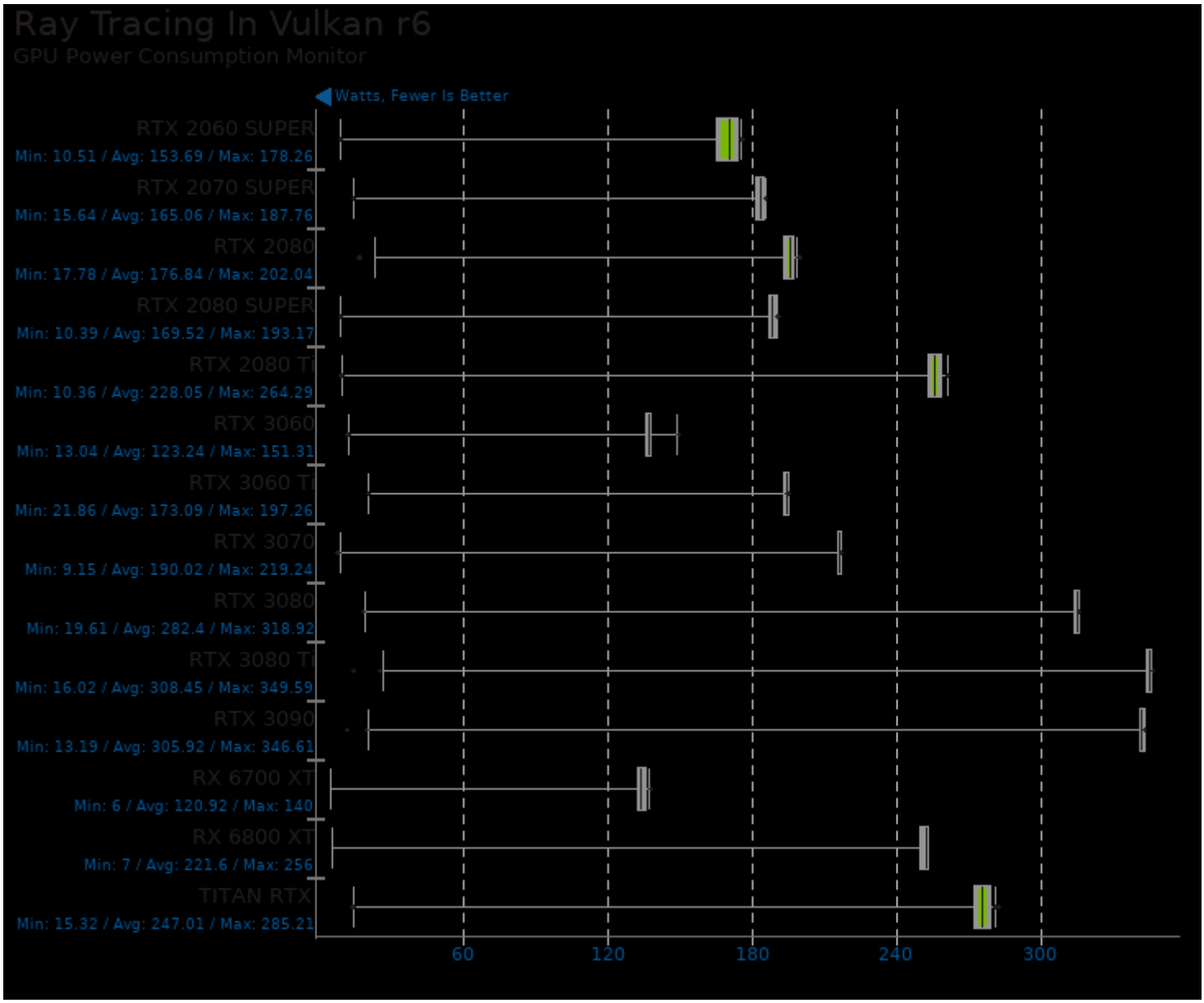
Vulkan Ray-Tracing GPUs



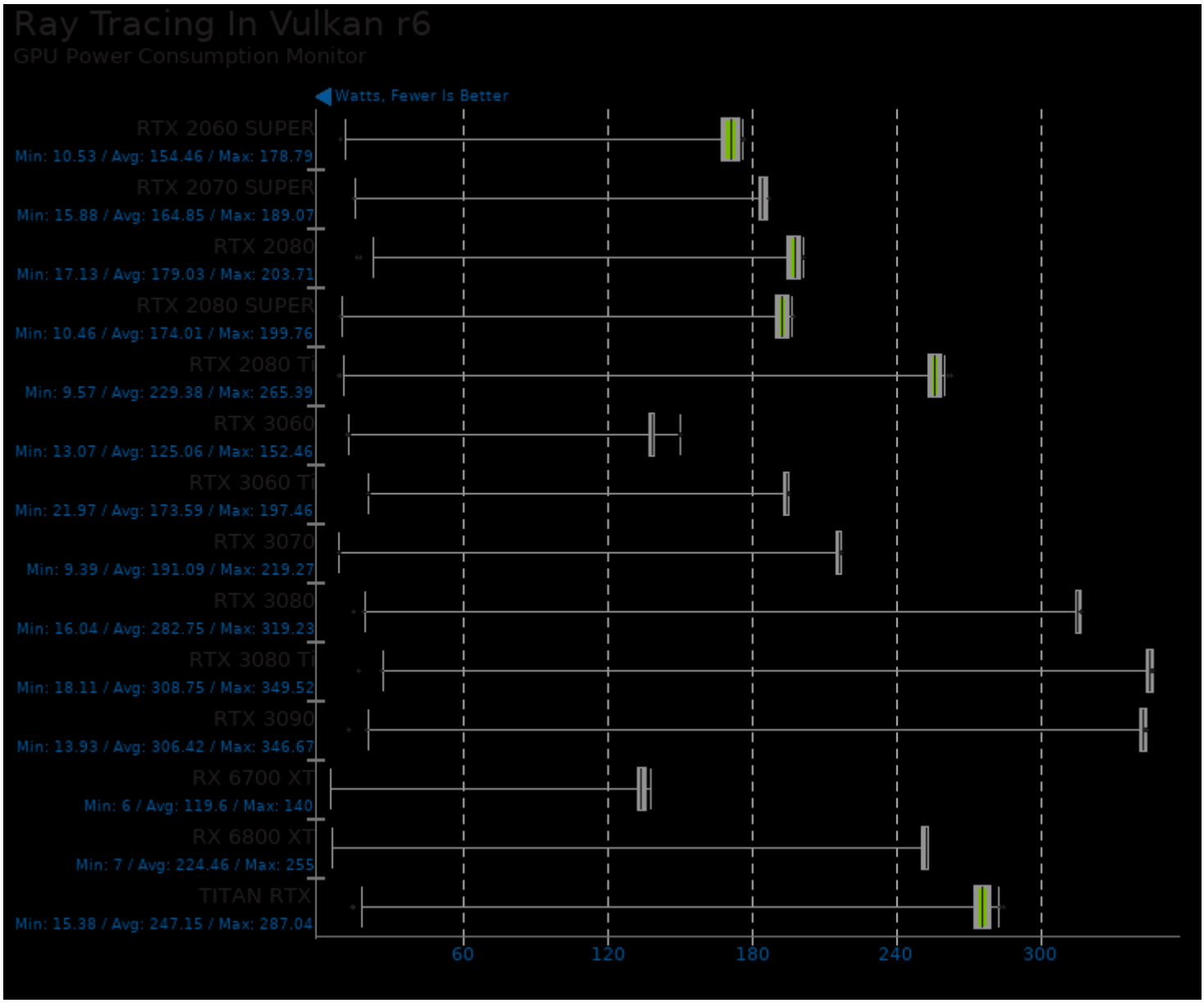
Vulkan Ray-Tracing GPUs



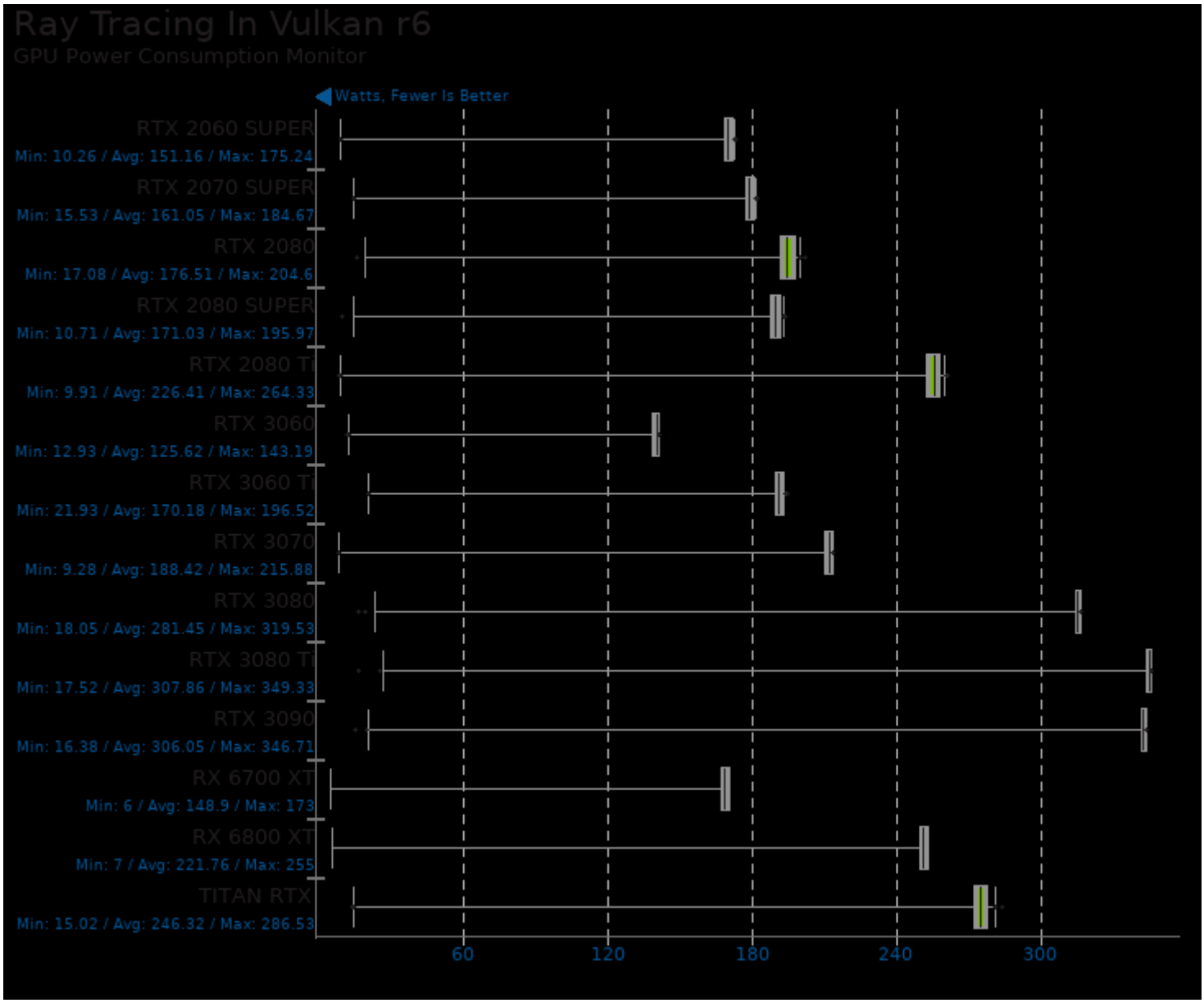
Vulkan Ray-Tracing GPUs



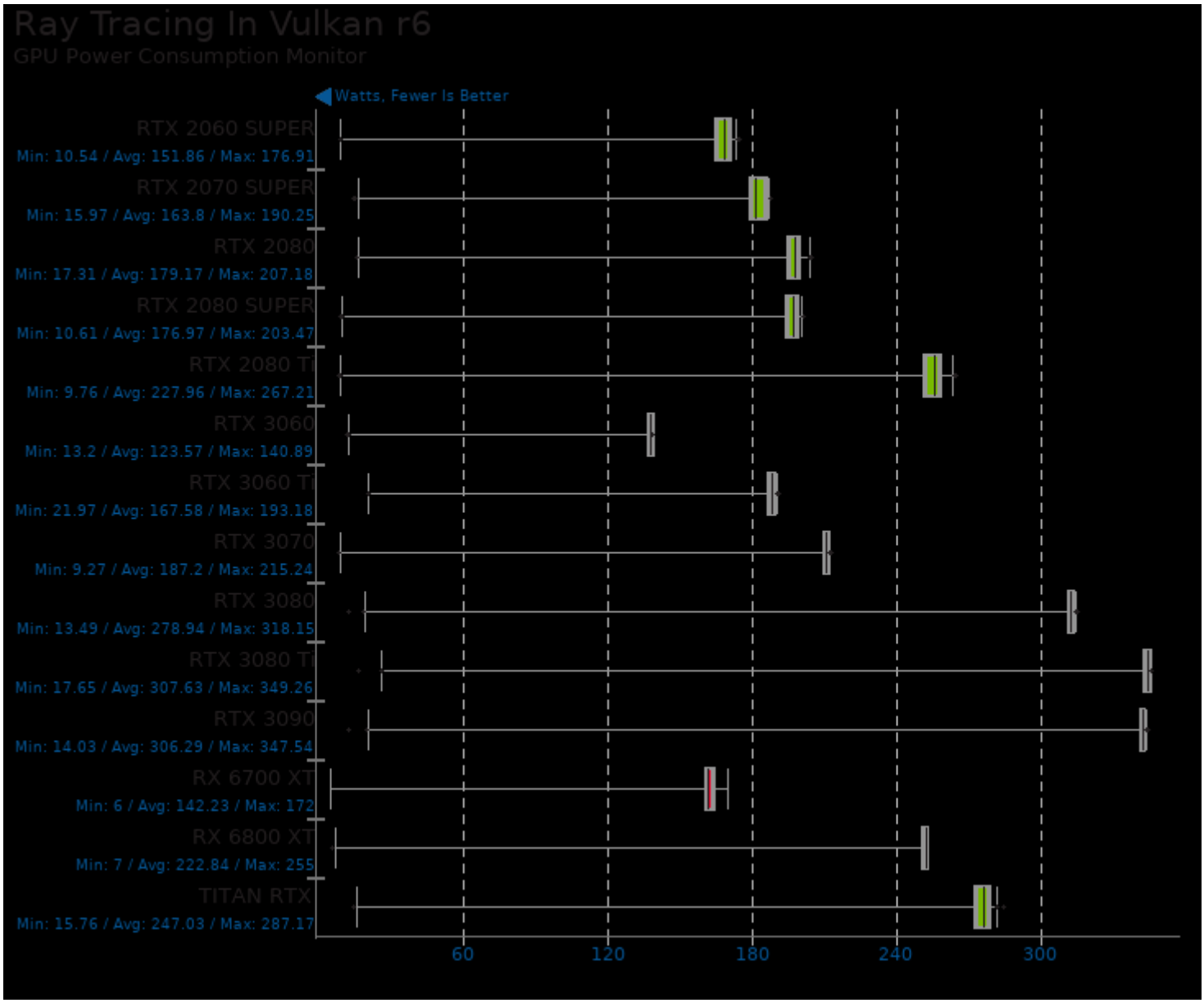
Vulkan Ray-Tracing GPUs



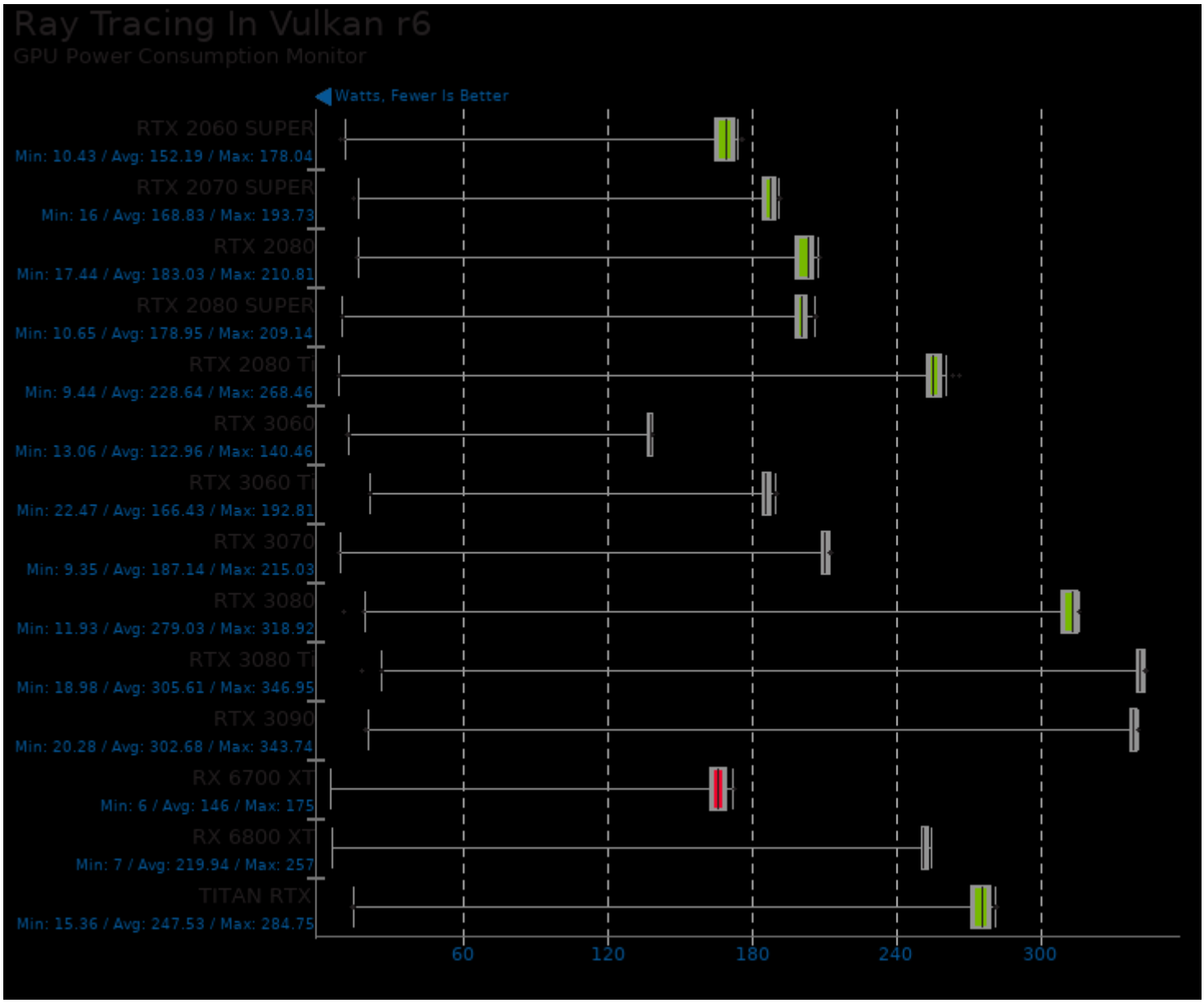
Vulkan Ray-Tracing GPUs



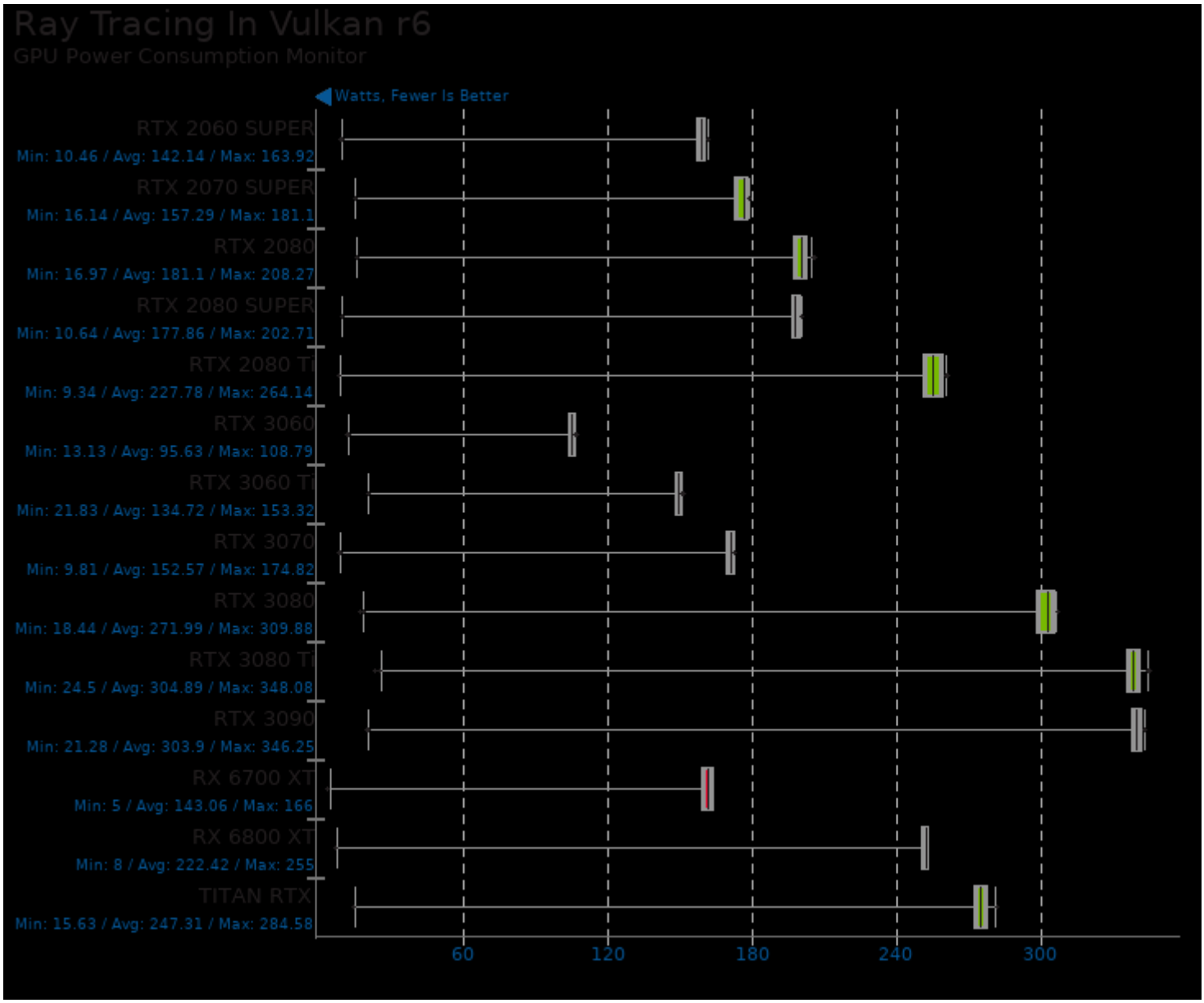
Vulkan Ray-Tracing GPUs



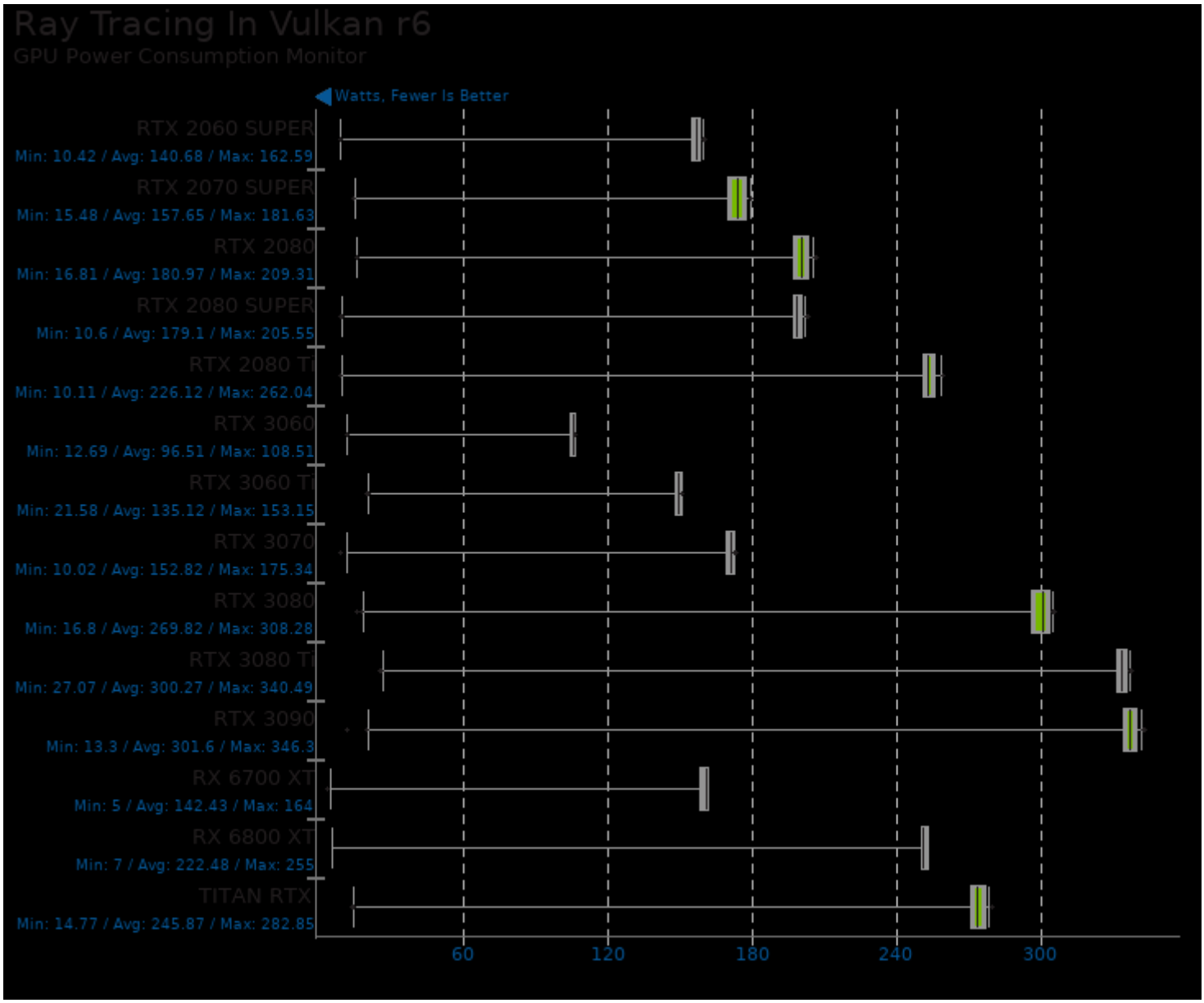
Vulkan Ray-Tracing GPUs



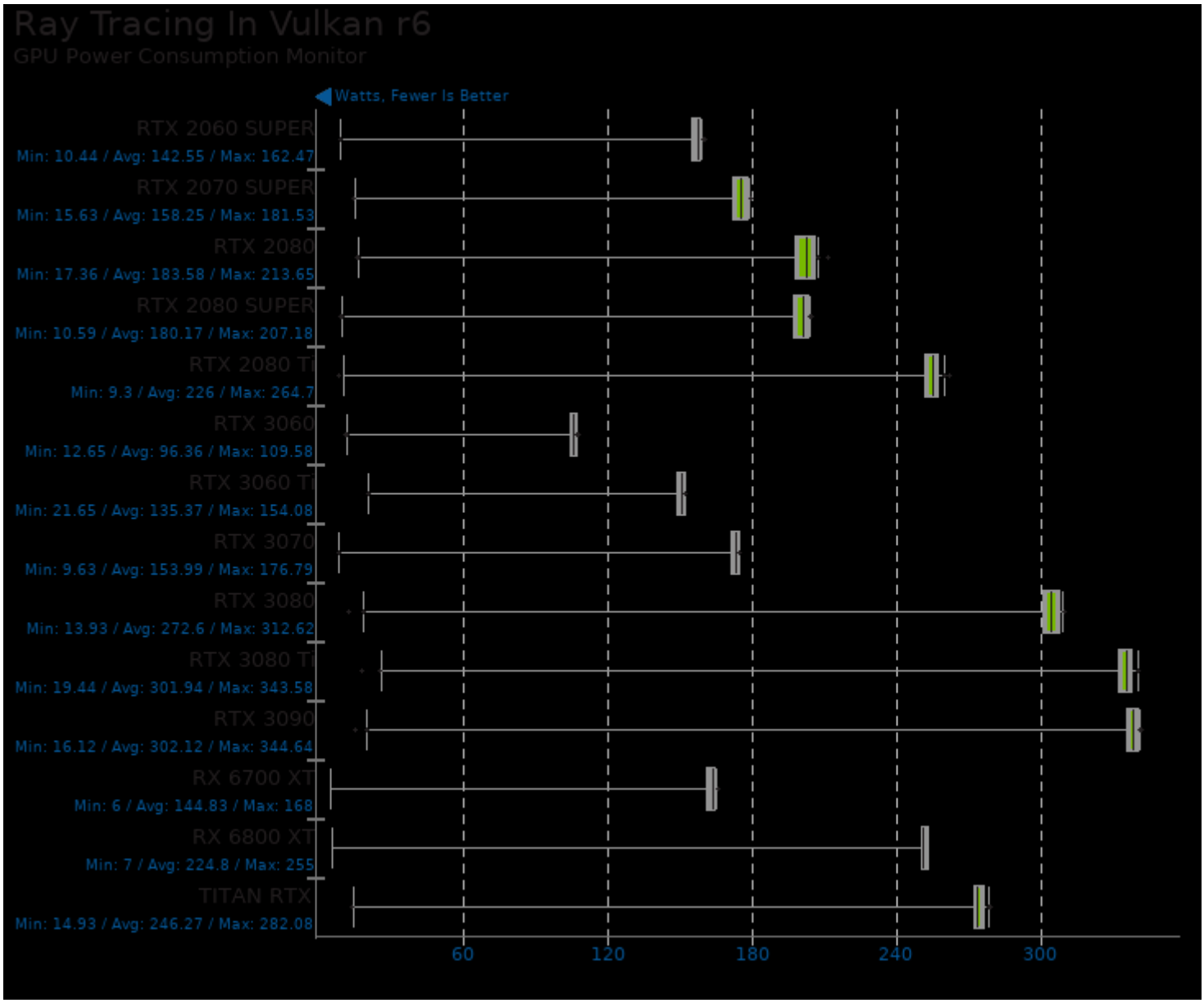
Vulkan Ray-Tracing GPUs



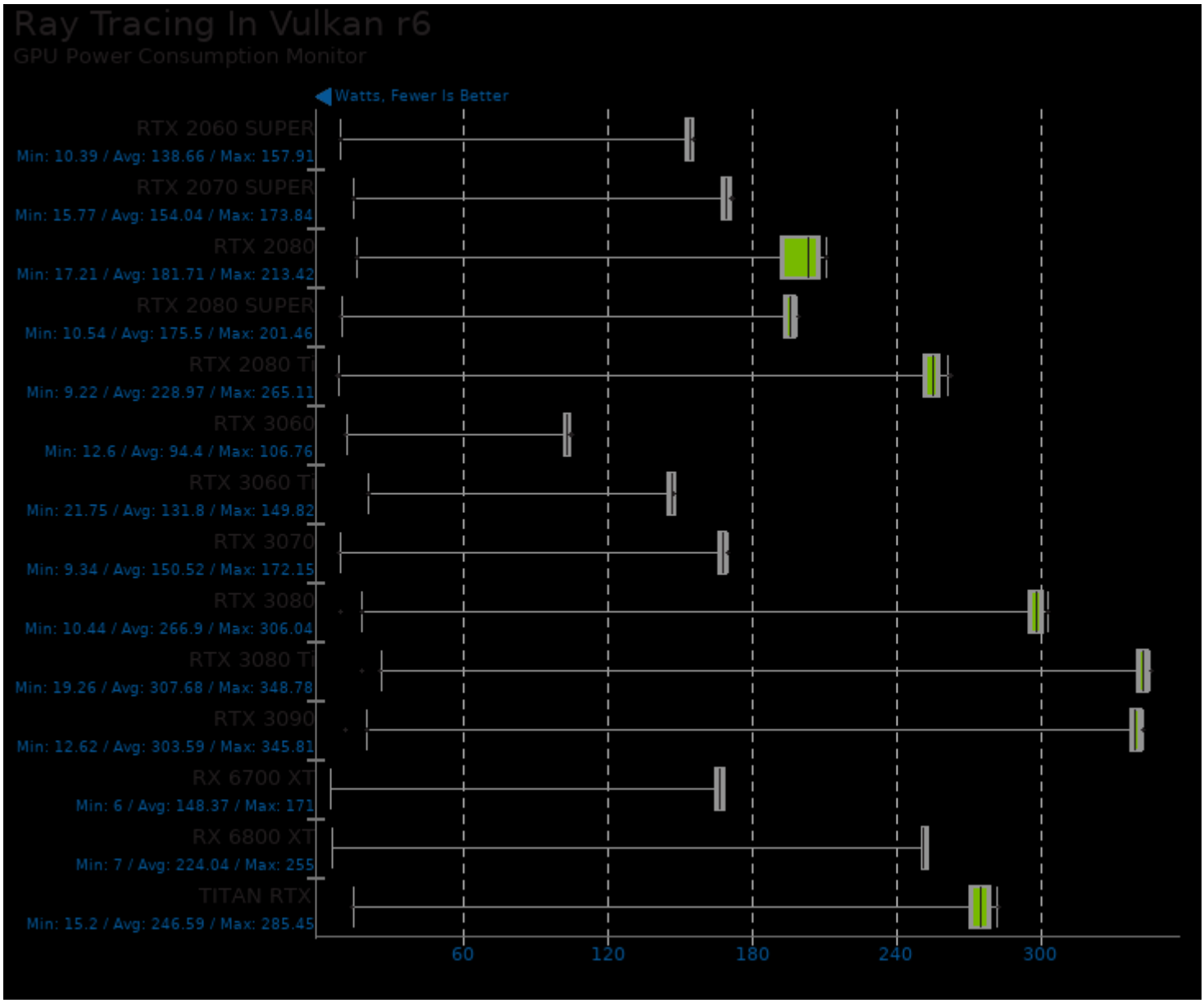
Vulkan Ray-Tracing GPUs



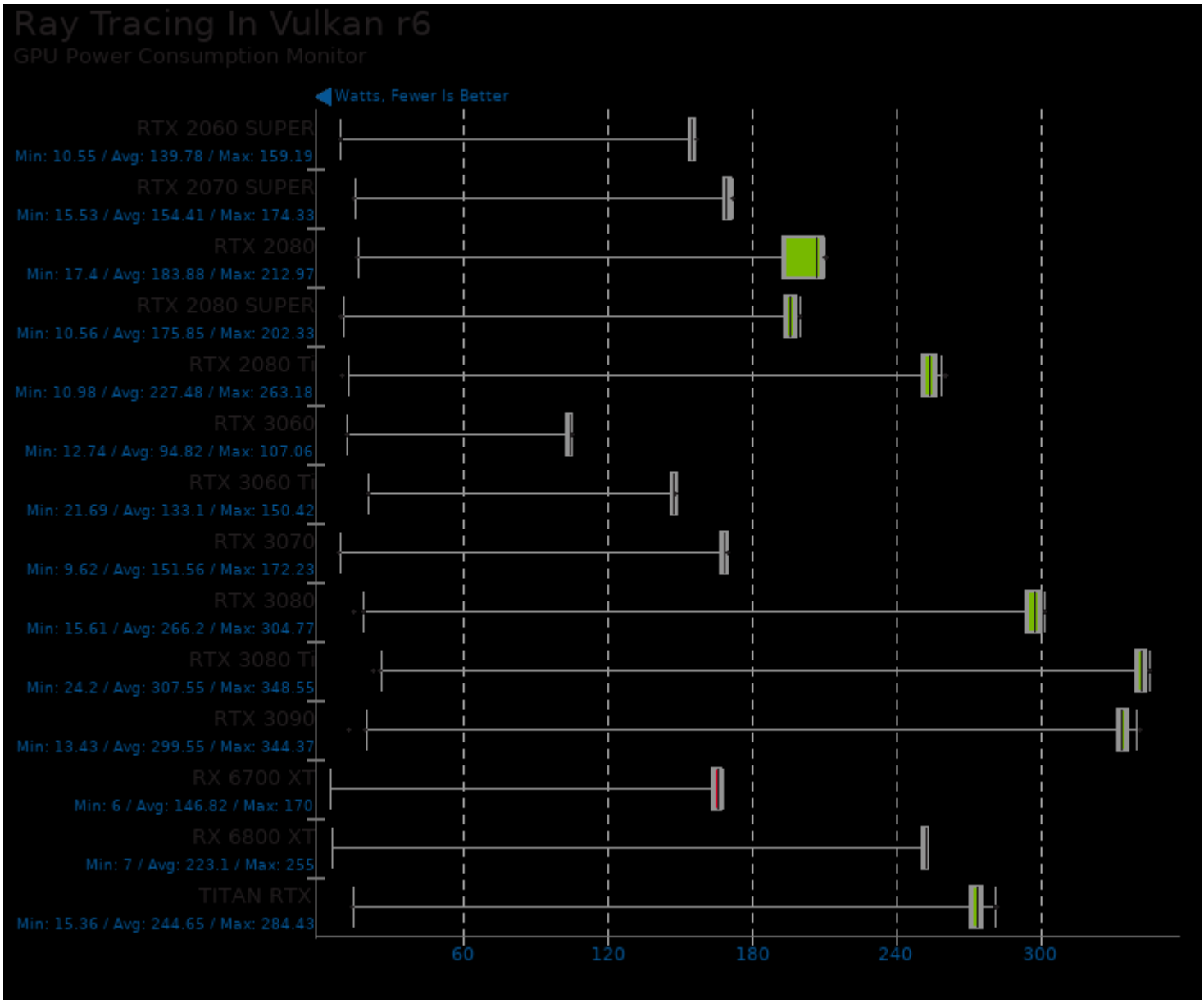
Vulkan Ray-Tracing GPUs



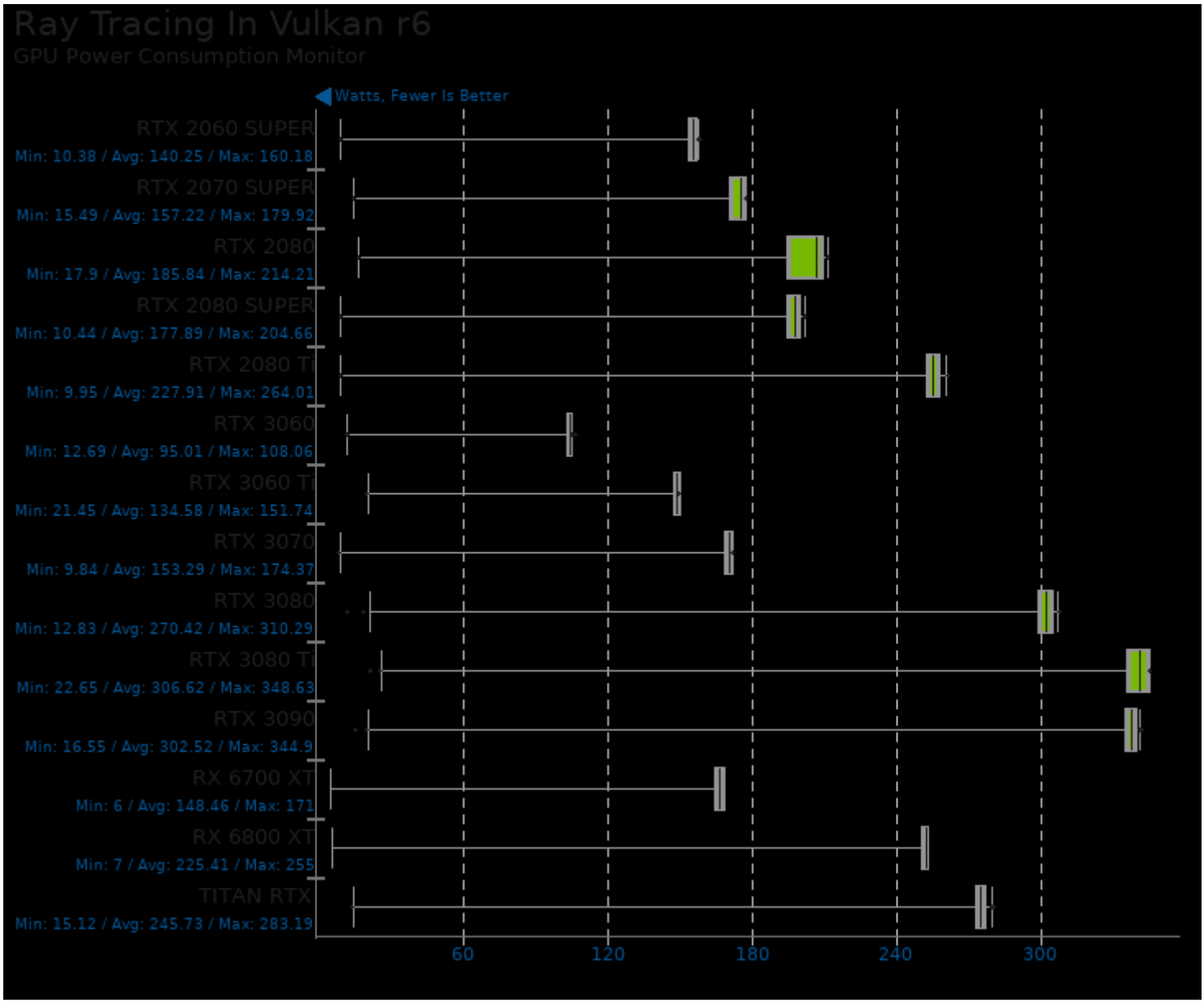
Vulkan Ray-Tracing GPUs



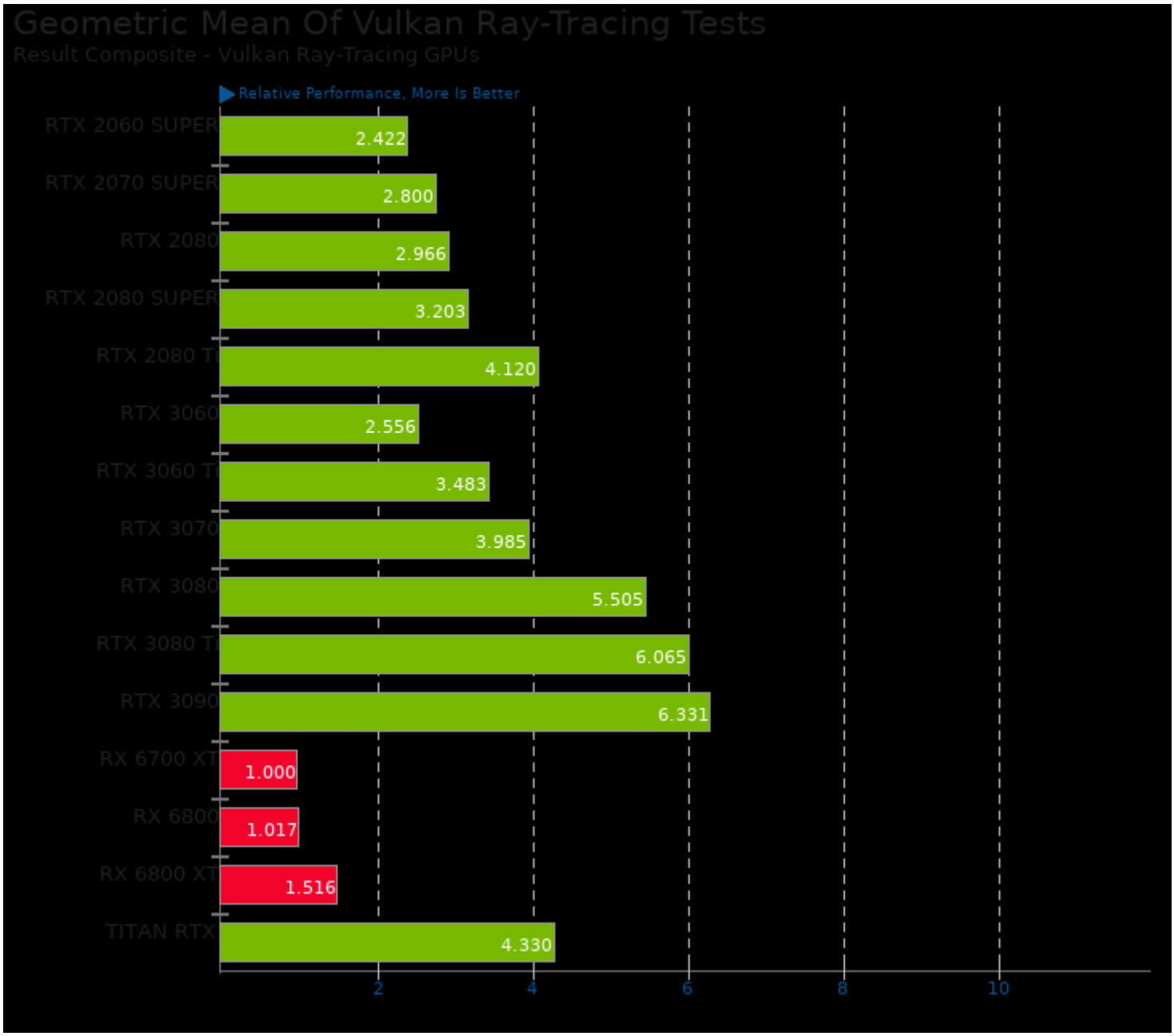
Vulkan Ray-Tracing GPUs



Vulkan Ray-Tracing GPUs



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



Geometric mean based upon tests: pts/rtiv and pts/quake2rtx

This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 02:25.