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Total War: WARHAMMER III Linux Performance

Benchmarks by Michael Larabel of Feral's Total War: Warhammer 3 Linux port.

Test Systems:

GTX 1070

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce GTX 1070 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 86.04.1e.00.01

Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

GTX 1660 SUPER

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: eVGA NVIDIA GeForce GTX 1660 SUPER 6GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 90.16.42.00.86
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2060

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 2060 6GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 90.06.2e.00.05
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2060 SUPER

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 2060 SUPER 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 90.06.44.00.01
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 2080 SUPER

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 2080 SUPER 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 90.04.79.00.01
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

TITAN RTX

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA TITAN RTX 24GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 256 MiB - vBIOS Version: 90.02.23.00.01
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3060

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: eVGA NVIDIA GeForce RTX 3060 12GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16384 MiB - vBIOS Version: 94.06.14.40.46
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3060 Ti

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital

WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3060 Ti 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8192 MiB - vBIOS Version: 94.04.25.00.2c
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3070

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3070 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8192 MiB - vBIOS Version: 94.04.25.00.2b
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3070 Ti

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3070 Ti 8GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8192 MiB - vBIOS Version: 94.04.5b.00.02
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3080

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3080 10GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16384 MiB - vBIOS Version: 94.02.20.00.07
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3080 Ti

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3080 Ti 12GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16384 MiB - vBIOS Version: 94.02.71.00.01
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RTX 3090

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: NVIDIA GeForce RTX 3090 24GB, Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3, Display Driver: NVIDIA 515.48.07, OpenGL: 4.6.0, OpenCL: OpenCL 3.0 CUDA 11.7.89, Vulkan: 1.3.205, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 32768 MiB - vBIOS Version: 94.02.27.00.02
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 590

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: Sapphire AMD Radeon RX 590 8GB (1560/2100MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8192 MB - vBIOS Version: 113-4E3661U-X6A
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX Vega 56

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 56/64 8GB (1590/800MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8176 MB - vBIOS Version: 113-D0500300-101
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

Radeon VII

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon VII 16GB (1801/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB - vBIOS Version: 113-D3600200-106
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 5500 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: Sapphire AMD Radeon RX 5500 XT 4GB (1900/875MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 4080 MB - vBIOS Version: 113-14211ME-U12
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not

affected + tsx_async_abort: Not affected

RX 5700 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 5700 XT 8GB (2100/875MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8176 MB - vBIOS Version: 113-D1820501-101
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6600

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: Gigabyte AMD Radeon RX 6600 8GB (2750/875MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8176 MB - vBIOS Version: 113-D53201-R66E
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6600 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 6600 XT 8GB (2900/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 8176 MB - vBIOS Version: 113-EXT800286-L04
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6700 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 6700 XT 12GB (2855/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 12272 MB - vBIOS Version: 113-D5121100-101
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6750 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 6750 XT 12GB (2880/1124MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 12272 MB - vBIOS Version: 113-EXT800357-L02
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6800

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 6800 16GB (2475/1000MHz), Audio: Intel Device 7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB - vBIOS Version: 113-D4120900-101
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

RX 6800 XT

Processor: Intel Core i9-12900K @ 5.20GHz (16 Cores / 24 Threads), Motherboard: ASUS ROG STRIX Z690-E GAMING WIFI (1003 BIOS), Chipset: Intel Device 7aa7, Memory: 32GB, Disk: 1000GB Western Digital WDS100T1X0E-00AFY0 + 2000GB, Graphics: AMD Radeon RX 6800 XT 16GB (2575/1000MHz), Audio: Intel Device

Total War: WARHAMMER III Linux Performance

7ad0, Monitor: ASUS VP28U, Network: Intel I225-V + Intel Wi-Fi 6 AX210/AX211/AX411

OS: Ubuntu 22.04, Kernel: 5.18.0-051800-generic (x86_64), Desktop: GNOME Shell 42.1, Display Server: X Server 1.21.1.3 + Wayland, OpenGL: 4.6 Mesa 22.2.0-devel (git-7a8ec23 2022-06-18 jammy-oibaf-ppa) (LLVM 14.0.4 DRM 3.46), Vulkan: 1.3.217, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 3840x2160

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: intel_pstate performance (EPP: performance) - CPU Microcode: 0x18 - Thermald 2.4.9
Graphics Notes: BAR1 / Visible vRAM Size: 16368 MB - vBIOS Version: 113-D4120500-101
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of usercopy/swapgs barriers and __user pointer sanitization + spectre_v2: Mitigation of Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	GTX 1070	GTX 1660 SUPER	RTX 2060	RTX 2060 SUPER	RTX 2080 SUPER	TITAN RTX	RTX 3060	RTX 3060 Ti	RTX 3070	RTX 3070 Ti	RTX 3080	RTX 3080 Ti	RTX 3090	RX 590	RX Vega 56	Radeon VII	RX 5500 XT	RX 5700 XT	RX 6600	RX 6600 XT	RX 6700 XT	RX 6750 XT	RX 6800	RX 6800 XT
Total War: WARHAMMER III - 1920 x 1080 - Medium - Battle Benchmark (FPS)	67.4	68.3	84.8	91.6	111.8	143.9	92.9	132.3	141.0	155.2	183.0	193.8	**199.9**	57.8	76.6	107.6	**46.1**	107.5	88.6	104.3	142.0	146.6	171.4	192.2
Normalized	33.7%	34.1%	42.4%	45.8%	59.1%	74.2%	46.4%	66.1%	70.5%	77.6%	91.5%	97.4%	100%	28.9%	38.3%	53.8%	23.0%	53.7%	44.3%	52.1%	71.0%	73.3%	85.7%	96.1%
Standard Deviation	0.5%	0.5%	1.1%	1.9%	0.9%	2.3%	0.3%	1.4%	2.1%	1.7%	2.4%	2.4%	2%	0.1%	0%	0.2%	0.1%	0.2%	0.2%	0.1%	0.4%	0.3%	0.4%	0.4%

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 1920 x 1080 - Medium - Battle Benchmark (FPS/Watt)	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	**0.4**	0.5	0.7	0.7	0.7	1.1	1.1	1.0	0.9	**1.2**	1.0
		79	7	68	49	13	51	65	84	55	6	41	77	**05**	79	74	06	49	15	67	42	6	**58**	53
Normalized	47.6	53.9	53.2	53.1	59.5	56.6	67.6	68.7	70.2	60.0	60.4	58.9	61.7	32.1	46.0	61.5	56.1	59.5	88.6	92.7	82.8	76.3	100	83.7
	9%	7%	6%	%	4%	8%	5%	6%	7%	2%	1%	%	6%	9%	3%	3%	2%	4%	3%	7%	3%	1%	%	%
Total War: WARHAMMER III - 1920 x 1080 - High - Battle Benchmark (FPS)	49.	50.	62.	69.	89.	11	66.	99.	10	11	13	14	**14**	40.	55.	77.	**35.**	78.	65.	77.	10	10	12	14
	8	1	6	0	2	2.8	1	3	5.5	6.1	2.8	5.2	**8.7**	9	8	1	**0**	4	2	5	5.7	8.7	6.8	3.3
Normalized	33.4	33.6	42.1	46.4	59.9	75.8	44.4	66.7	70.9	78.0	89.3	97.6	100	27.5	37.5	51.8	23.5	52.7	43.8	52.1	71.0	73.1	85.2	96.3
	9%	9%	%	%	9%	6%	5%	8%	5%	8%	1%	5%	%	1%	3%	5%	4%	2%	5%	2%	8%	%	7%	7%
Standard Deviation	0.4	0.2	0.5	0.4	1%	2.3	1%	1%	1.1	2.1	2.3	0.8	2.3	0.3	0.3	1.2	2.4	0.1	0.4	0.1	0.3	0.2	0%	0.2
	%	%	%	%		%			%	%	%	%	%	%	%	%	%	%	%	%	%	%		%

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 1920 x 1080 - High - Battle Benchmark (FPS/Watt)	0.4 21	0.4 85	0.4 77	0.4 86	0.5 11	0.5 03	0.5 88	0.6 22	0.6 34	0.5 28	0.5 29	0.5 32	0.5 54	**0.2 79**	0.4 07	0.5 3	0.5 11	0.5 34	0.7 95	0.8 21	0.7 3	0.6 71	**0.8 65**	0.7 22
Normalized	48.6 7%	56.0 7%	55.1 4%	56.1 8%	59.0 8%	58.1 5%	67.9 8%	71.9 1%	73.2 9%	61.0 4%	61.1 6%	61.5 %	64.0 5%	32.2 5%	47.0 5%	61.2 7%	59.0 8%	61.7 3%	91.9 1%	94.9 1%	84.3 9%	77.5 7%	100 %	83.4 7%
Total War: WARHAMMER III - 1920 x 1080 - Ultra - Battle Benchmark (FPS)	43. 6	42. 4	53. 9	59. 1	76. 2	95. 7	55. 8	84. 6	90. 7	99. 9	11 3.5	12 2.0	**12 4.8**	35. 2	47. 9	65. 1	**24. 2**	67. 7	56. 1	66. 1	90. 6	93. 3	10 8.4	12 1.8
Normalized	34.9 4%	33.9 7%	43.1 9%	47.3 6%	61.0 6%	76.6 8%	44.7 1%	67.7 9%	72.6 8%	80.0 5%	90.9 5%	97.7 6%	100 %	28.2 1%	38.3 8%	52.1 6%	19.3 9%	54.2 5%	44.9 5%	52.9 6%	72.6 %	74.7 6%	86.8 6%	97.6 %
Standard Deviation	0.5 %	0.9 %	0.5 %	0.4 %	0.7 %	1.6 %	0.4 %	1.2 %	0.9 %	2.4 %	2.3 %	1%	2.4 %	0.3 %	0.4 %	2.1 %	6%	0.4 %	0.1 %	0.1 %	0.3 %	0.2 %	0.2 %	0.2 %

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 1920 x 1080 - Ultra - Battle Benchmark (FPS/Watt)	0.375	0.412	0.412	0.417	0.446	0.432	0.511	0.529	0.549	0.459	0.457	0.451	0.469	0.247	0.349	0.468	0.403	0.462	0.685	0.728	0.64	0.592	0.76	0.627
Normalized	49.34%	54.21%	54.21%	54.87%	58.68%	56.84%	67.24%	69.69%	72.29%	60.49%	60.17%	59.34%	61.69%	32.57%	45.92%	61.58%	53.03%	60.79%	90.19%	95.92%	84.21%	77.92%	100%	82.57%
Total War: WARHAMMER III - 2560 x 1440 - Medium - Battle Benchmark (FPS)	42.8	43.8	54.8	60.3	80.4	10 6.0	62.3	91.5	98.7	10 9.4	12 9.8	14 2.1	14 7.6	37.5	49.8	72.9	38.3	69.3	53.6	63.9	89.5	92.3	11 3.8	12 7.9
Normalized	29%	29.6%	37.1%	40.8%	54.4%	71.8%	42.2%	61.9%	66.8%	74.1%	87.9%	96.2%	100%	25.4%	33.7%	49.3%	25.9%	46.9%	36.3%	43.2%	60.6%	62.5%	77.1%	86.6%
Standard Deviation	0.8%	0.3%	0.9%	0.6%	0.1%	0.4%	0.7%	0.9%	1%	0.6%	1.7%	1.7%	1.4%	0.3%	0.1%	0.1%	12%	0%	0%	0.2%	0.1%	0%	0.3%	0.6%

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 2560 x 1440 - Medium - Battle Benchmark (FPS/Watt)	0.3 57	0.4 21	0.4 15	0.4 41	0.4 43	0.4 66	0.5 18	0.5 65	0.5 7	0.4 77	0.5 03	0.5 09	0.5 29	**0.2 51**	0.3 64	0.4 69	0.5 23	0.4 69	0.6 5	0.6 78	0.6 04	0.5 58	**0.7 4**	0.6 19
Normalized	48.2%	56.8%	56.0%	59.5%	59.8%	62.9%	70%	76.3%	77.0%	64.4%	67.9%	68.7%	71.4%	33.9%	49.1%	63.3%	70.6%	63.3%	87.8%	91.6%	81.6%	75.4%	100%	83.6%
Total War: WARHAMMER III - 2560 x 1440 - High - Battle Benchmark (FPS)	32.2	32.1	41.2	45.6	60.8	79.9	45.1	66.8	73.0	82.0	96.6	10 6.2	**11 1.3**	26.9	36.8	53.2	**23.4**	51.4	40.9	49.2	68.0	70.0	86.3	97.1
Normalized	28.9%	28.8%	37.0%	40.9%	54.6%	71.7%	40.5%	60.0%	65.5%	73.6%	86.7%	95.4%	100%	24.1%	33.0%	47.8%	21.0%	46.1%	36.7%	44.2%	61.1%	62.8%	77.5%	87.2%
Standard Deviation	0.6%	0.9%	0.4%	0.2%	0.3%	0.9%	0.2%	1%	1%	1.1%	1.6%	1%	0.1%	0.2%	0.2%	0.1%	0%	0.2%	0.1%	0.4%	0.2%	0.2%	0.4%	0.2%

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 2560 x 1440 - High - Battle Benchmark (FPS/Watt)	0.2 74	0.3 7	0.3 15	0.3 32	0.3 21	0.3 47	0.3 76	0.4 1	0.4 21	0.3 55	0.3 75	0.3 8	0.3 96	**0.1 8**	0.2 7	0.3 37	0.3 41	0.3 48	0.4 95	0.5 06	0.4 53	0.4 18	**0.5 46**	0.4 64
Normalized	50.1%	67.7%	57.6%	60.8%	58.7%	63.5%	68.8%	75.0%	77.1%	65.0%	68.6%	69.6%	72.5%	32.9%	49.4%	61.7%	62.4%	63.7%	90.6%	92.6%	82.9%	76.5%	100%	84.9%
Total War: WARHAMMER III - 2560 x 1440 - Ultra - Battle Benchmark (FPS)	28.8	28.6	36.3	40.2	53.0	69.3	39.0	59.0	64.3	71.8	84.6	92.9	**96.6**	23.9	32.5	45.9	**19.3**	45.7	36.5	43.7	60.3	62.2	75.6	85.5
Normalized	29.8%	29.6%	37.5%	41.6%	54.8%	71.7%	40.3%	61.0%	66.5%	74.3%	87.5%	96.1%	100%	24.7%	33.6%	47.5%	19.9%	47.3%	37.7%	45.2%	62.4%	64.3%	78.2%	88.5%
Standard Deviation	0.2%	0.9%	0.2%	0.7%	0.6%	2%	0.5%	0.6%	0.8%	1.1%	1.3%	1.1%	1.2%	0.2%	0%	2.5%	1.8%	0.1%	0.3%	0.6%	0.2%	0.2%	0.1%	0.3%

Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 2560 x 1440 - Ultra - Battle Benchmark (FPS/Watt)	0.247	0.376	0.282	0.289	0.304	0.334	0.363	0.374	0.414	0.428	0.436	0.447	0.463	**0.163**	0.236	0.302	0.291	0.311	0.443	0.458	0.405	0.373	**0.489**	0.413
Normalized	50.51%	61.35%	56.49%	57.67%	59.17%	62.17%	68.34%	74.23%	76.48%	64.21%	67.08%	68.79%	70.91%	33.33%	48.26%	61.72%	59.51%	63.61%	90.59%	93.66%	82.85%	76.28%	100%	84.46%
Total War: WARHAMMER III - 3840 x 2160 - Medium - Battle Benchmark (FPS)	21.0	21.7	27.5	30.5	42.0	56.1	32.4	46.9	51.1	57.9	71.9	79.6	**83.1**	18.7	25.1	38.3	**12.6**	34.4	25.6	30.9	42.3	43.8	55.7	62.4
Normalized	25.27%	26.11%	33.09%	36.75%	50.54%	67.51%	38.94%	56.49%	61.41%	69.68%	86.52%	95.79%	100%	22.51%	30.21%	46.09%	15.16%	41.41%	30.81%	37.18%	50.91%	52.71%	67.03%	75.09%
Standard Deviation	0.5%	0.5%	0.4%	0.6%	0.5%	0.7%	0.2%	0.2%	0.6%	0.2%	0.5%	0.9%	1.1%	0.3%	0%	0.2%	0.5%	0.2%	0%	0%	0.3%	0.3%	0.2%	0.2%

Total War: WARHAMMER III Linux Performance

Phoronix Test Suite

Total War: WARHAMMER III - 3840 x 2160 - Medium - Battle Benchmark (FPS/Watt)	0.177	0.21	0.21	0.212	0.215	0.242	0.252	0.286	0.285	0.246	0.272	0.278	0.289	0.122	0.182	0.128	0.202	0.232	0.231	0.28	0.261	0.345	0.296
Normalized	51.3%	60.8%	60.8%	61.4%	62.3%	70.1%	73.0%	82.9%	82.6%	71.3%	78.8%	80.5%	83.7%	35.3%	52.7%	66.0%	58.5%	67.2%	89.8%	92.1%	81.1%	75.6%	100%	85.8%
Total War: WARHAMMER III - 3840 x 2160 - High - Battle Benchmark (FPS)	15.9	16.4	20.9	23.2	31.7	42.4	23.6	34.9	38.5	43.3	53.0	59.0	61.5	13.7	19.0	28.2	6.2	26.0	20.0	24.5	32.9	34.2	43.5	48.7
Normalized	25.8%	26.6%	33.9%	37.7%	51.5%	68.9%	38.3%	56.7%	62.6%	70.4%	86.1%	95.9%	100%	22.2%	30.8%	45.8%	10.0%	42.2%	32.5%	39.8%	53.5%	55.6%	70.7%	79.1%
Standard Deviation	1%	0.6%	1%	0.2%	0.5%	2.5%	0.4%	0.6%	0.9%	0.4%	0.9%	0.7%	0.8%	0.4%	0.3%	0%	10.5%	0.4%	0.3%	0%	0.3%	0%	0.1%	0.2%

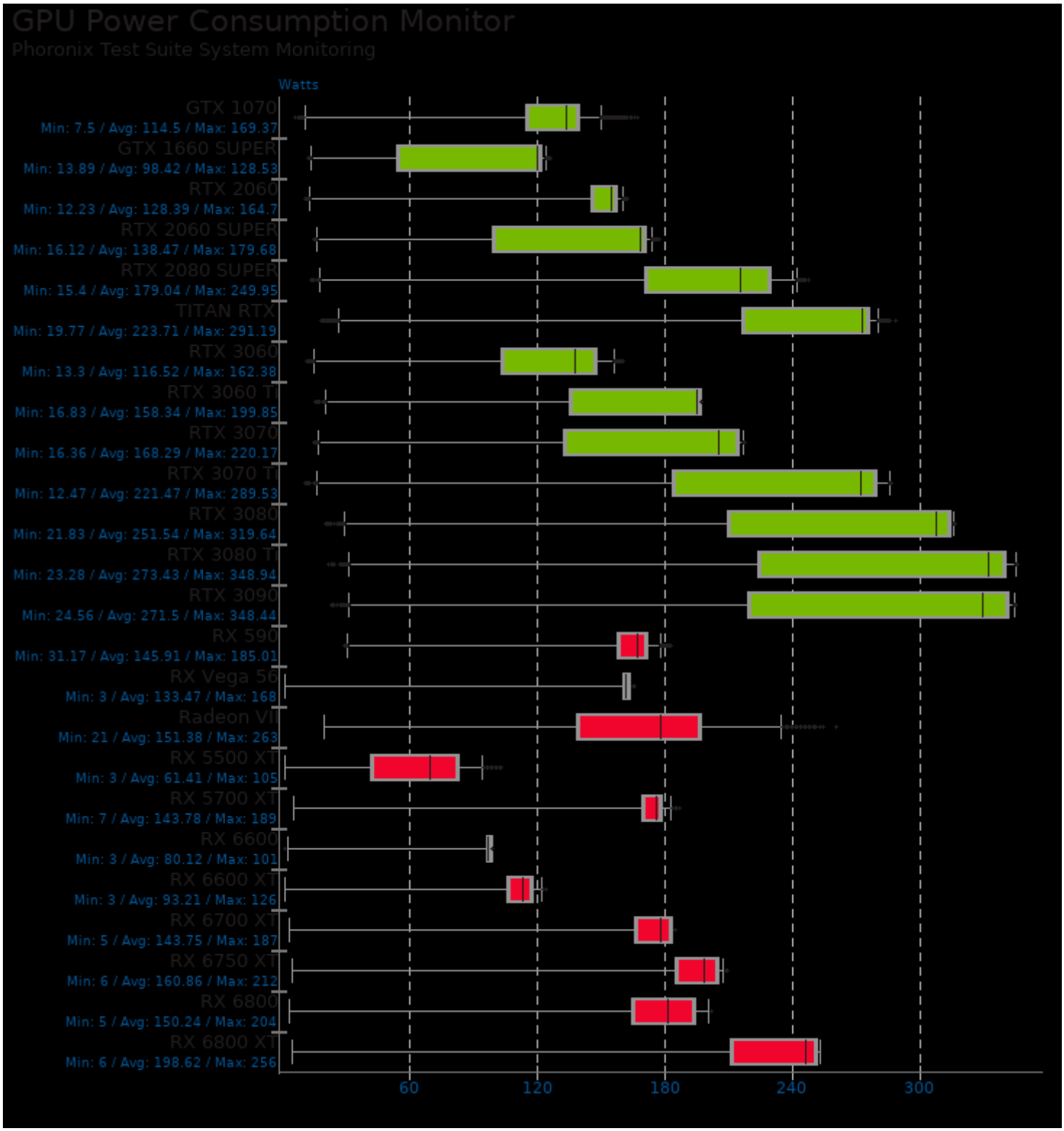
Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 3840 x 2160 - High - Battle Benchmark (FPS/Watt)	0.139	0.158	0.158	0.161	0.161	0.183	0.186	0.212	0.216	0.186	0.201	0.204	0.214	**0.089**	0.139	0.167	0.115	0.176	0.243	0.244	0.217	0.200	**0.262**	0.232
Normalized	53.0%	60.3%	60.3%	61.4%	61.4%	69.8%	70.9%	80.9%	82.4%	70.9%	76.7%	77.8%	81.6%	33.9%	53.0%	63.7%	43.8%	67.1%	92.7%	93.1%	82.8%	76.3%	100%	88.5%
Total War: WARHAMMER III - 3840 x 2160 - Ultra - Battle Benchmark (FPS)	14.38	15.54	19.28	21.27	28.87	38.63	21.44	31.66	35.11	39.32	48.61	53.11	**55.4**	12.44	17.23	25.33	**5.4**	24.40	18.55	22.55	30.53	31.66	39.77	44.66
Normalized	26.7%	27.8%	35.7%	38.2%	51.8%	69.1%	38.6%	57.0%	63.3%	70.7%	86.8%	95.8%	100%	22.3%	31.0%	45.6%	9.75%	43.3%	33.3%	40.6%	54.6%	57.0%	71.6%	80.5%
Standard Deviation	0.4%	1.9%	0.5%	0.5%	0.5%	2.5%	0.7%	0.7%	0.7%	0.1%	0.2%	0.3%	1%	0.5%	0%	0.2%	2.4%	0.2%	0%	0.3%	0.2%	0.2%	0.3%	0.1%

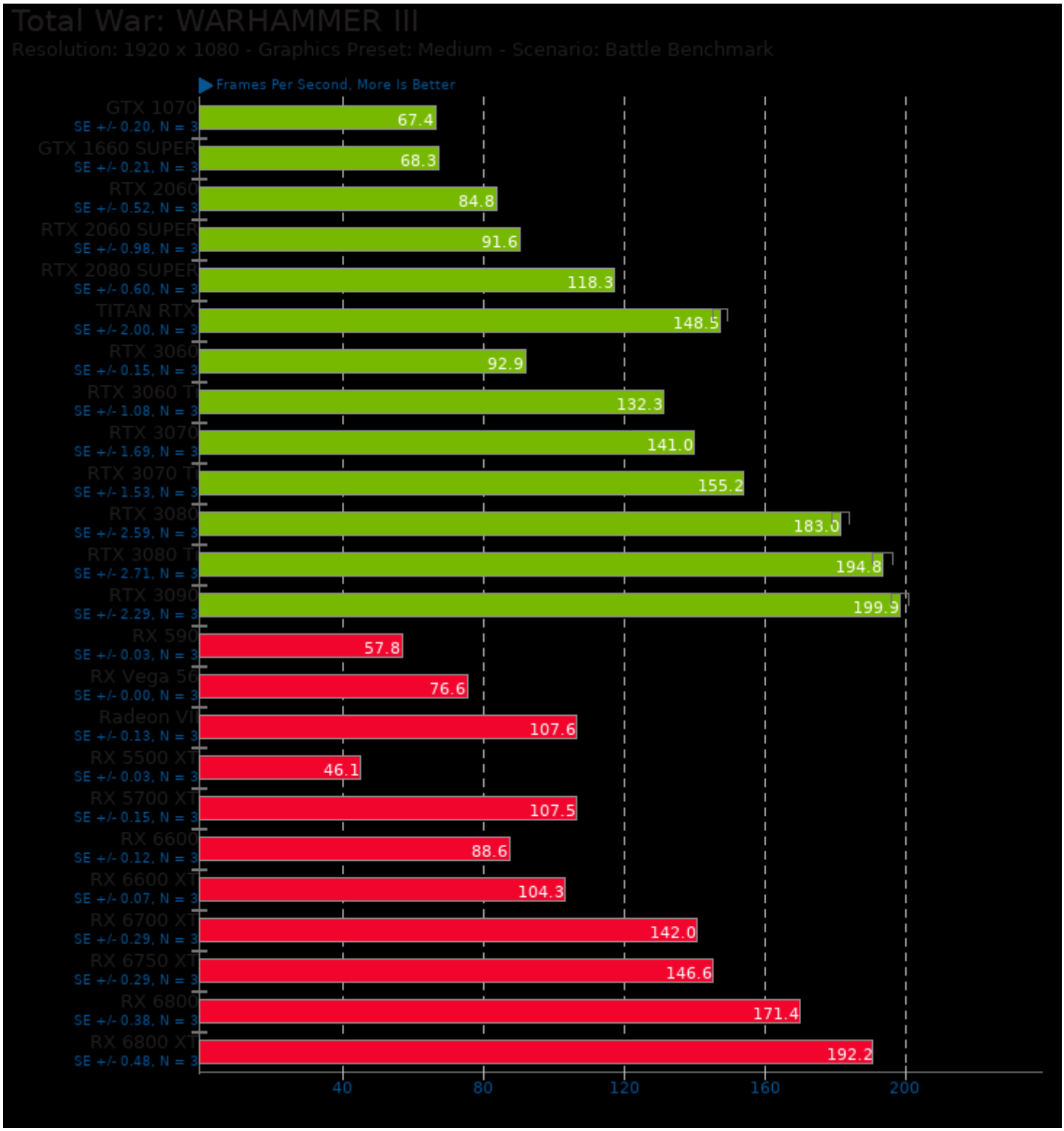
Total War: WARHAMMER III Linux Performance

Total War: WARHAMMER III - 3840 x 2160 - Ultra - Battle Benchmark (FPS/Watt)	0.129	0.148	0.151	0.147	0.148	0.165	0.172	0.192	0.198	0.169	0.182	0.184	0.193	0.081	0.126	0.153	0.102	0.163	0.225	0.227	0.201	0.186	0.241
Normalized	53.53%	61.41%	62.66%	61%	61.41%	68.46%	71.37%	79.67%	82.16%	70.12%	75.52%	76.35%	80.08%	33.61%	52.28%	63.49%	42.32%	67.63%	93.36%	94.19%	83.41%	77.18%	100%	87.55%

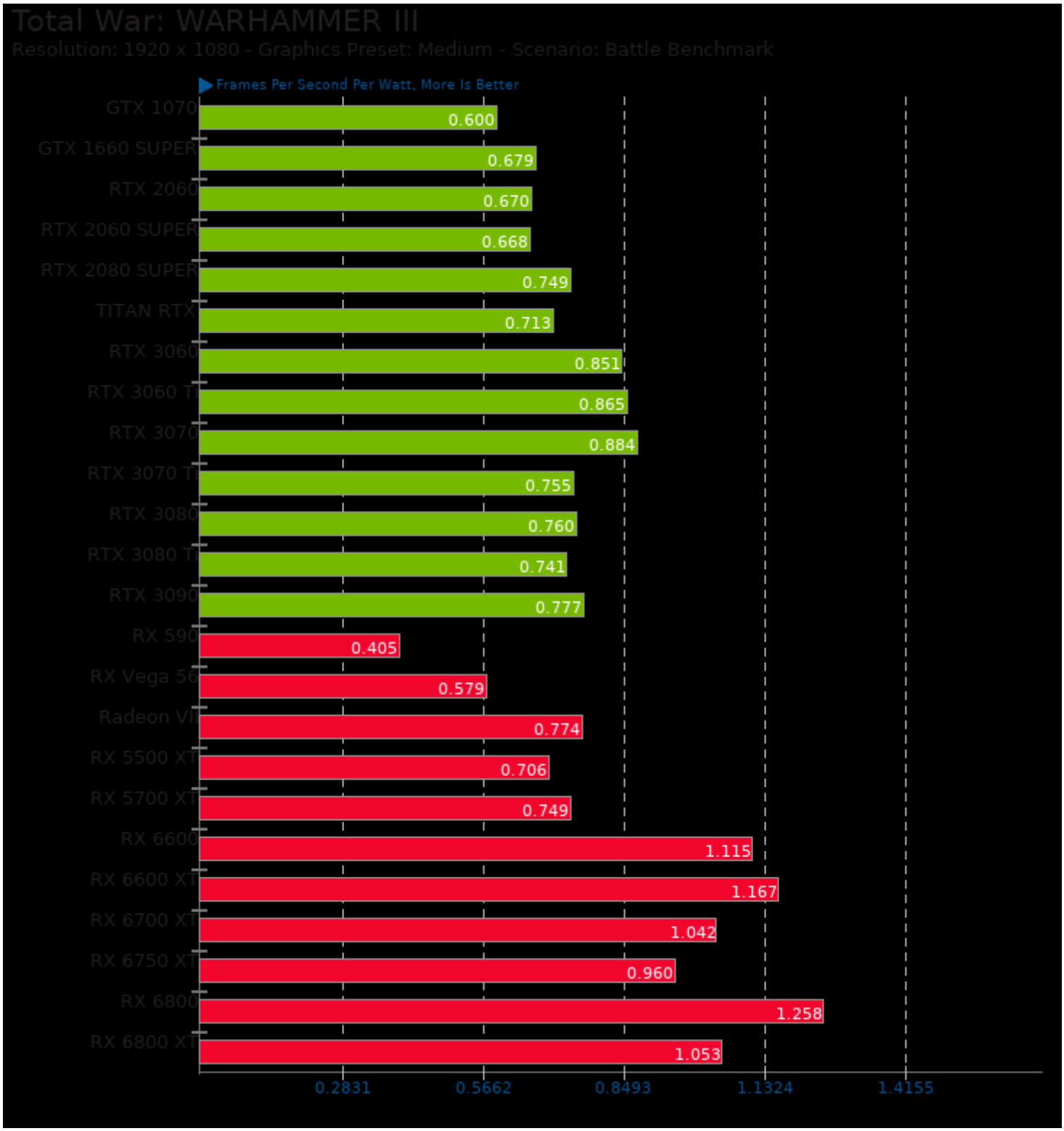
Total War: WARHAMMER III Linux Performance



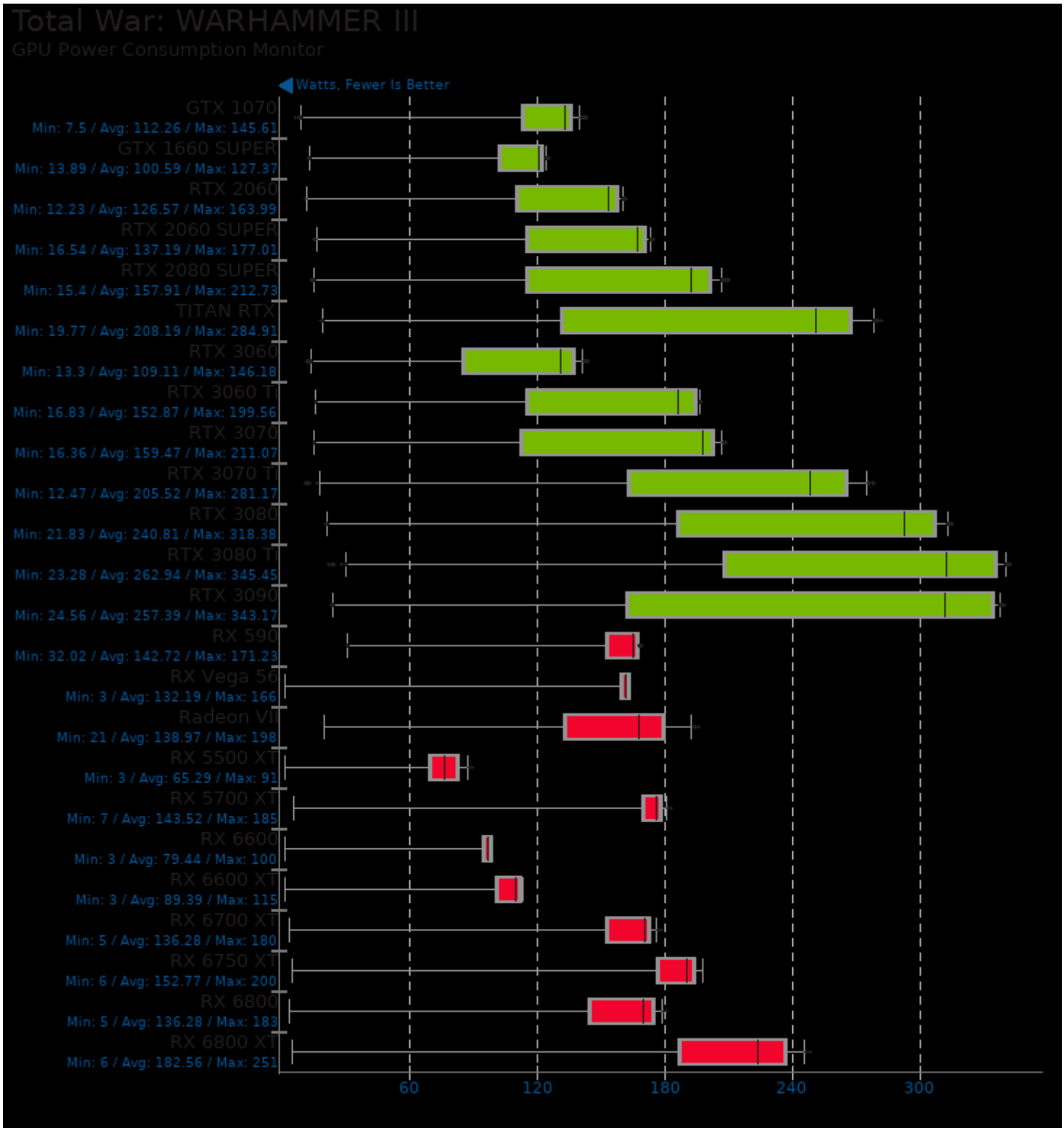
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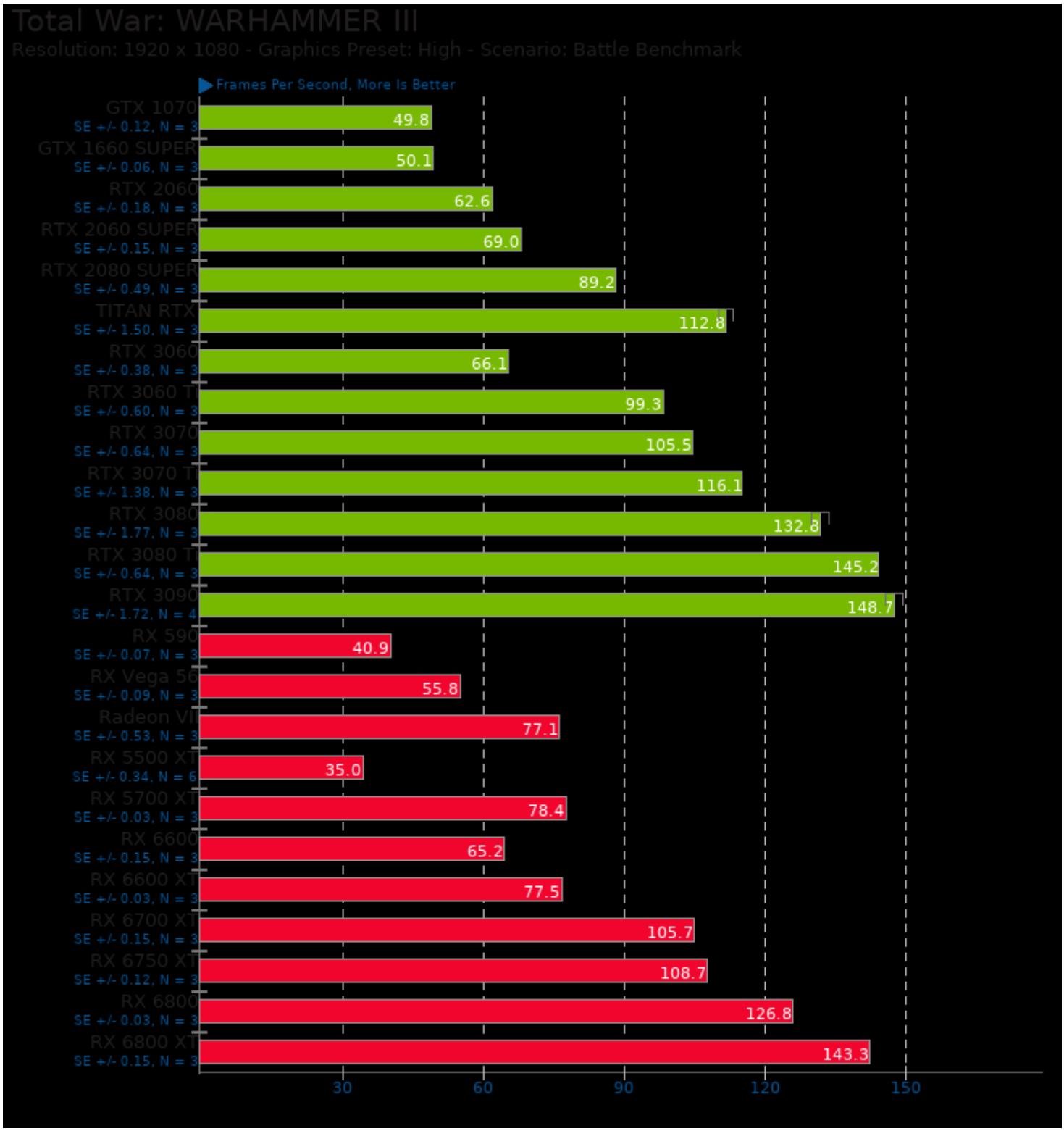
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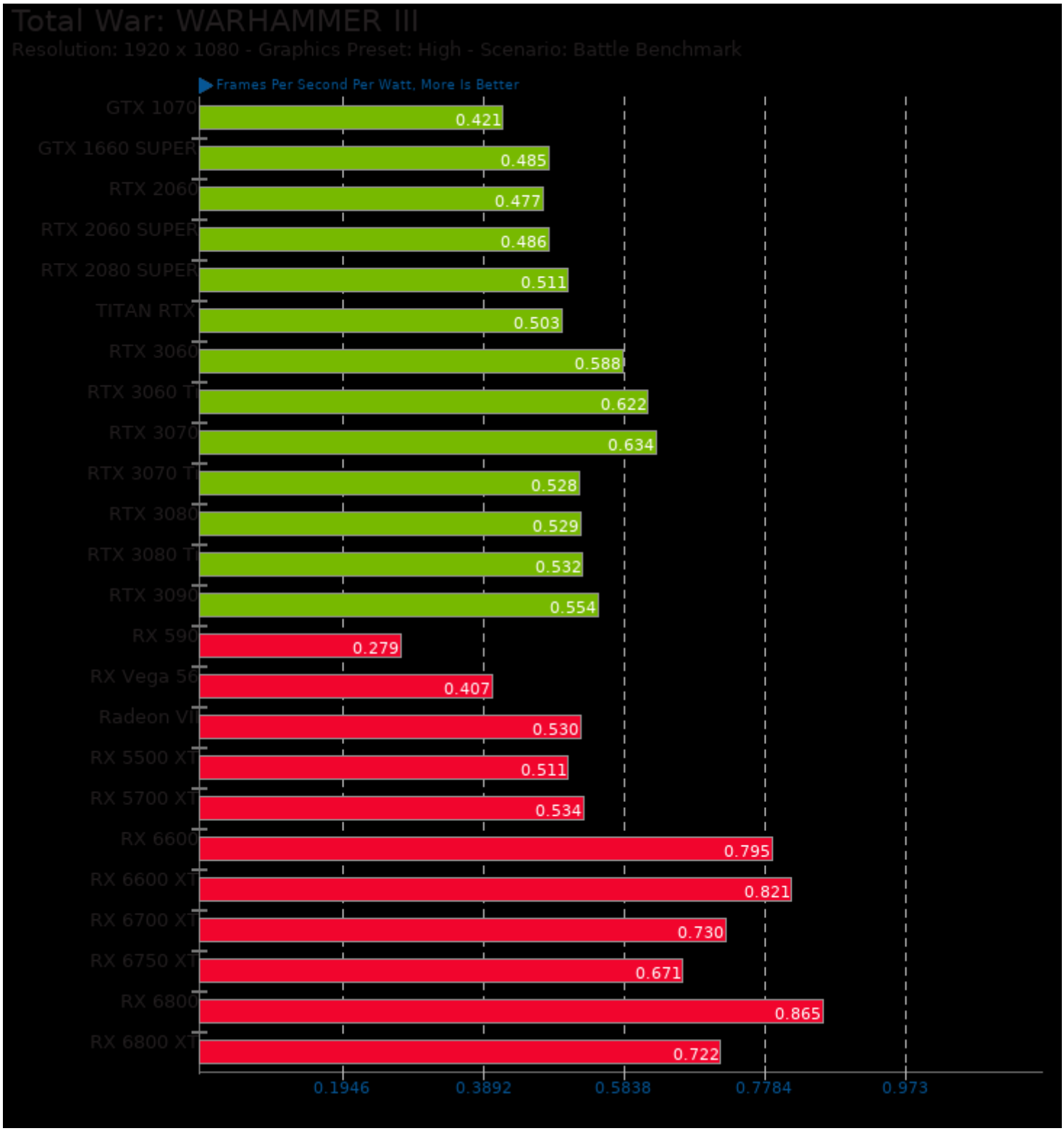
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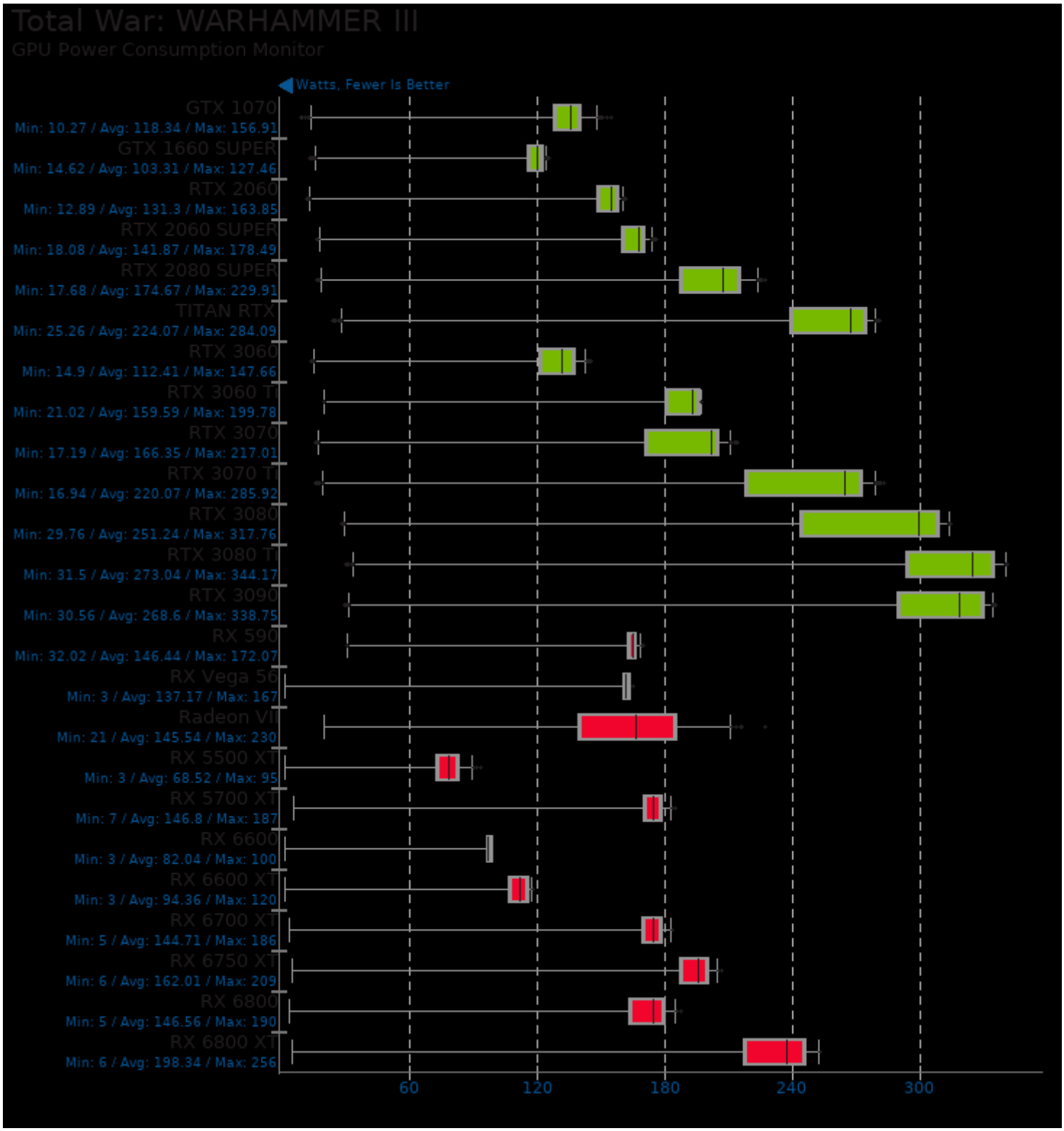
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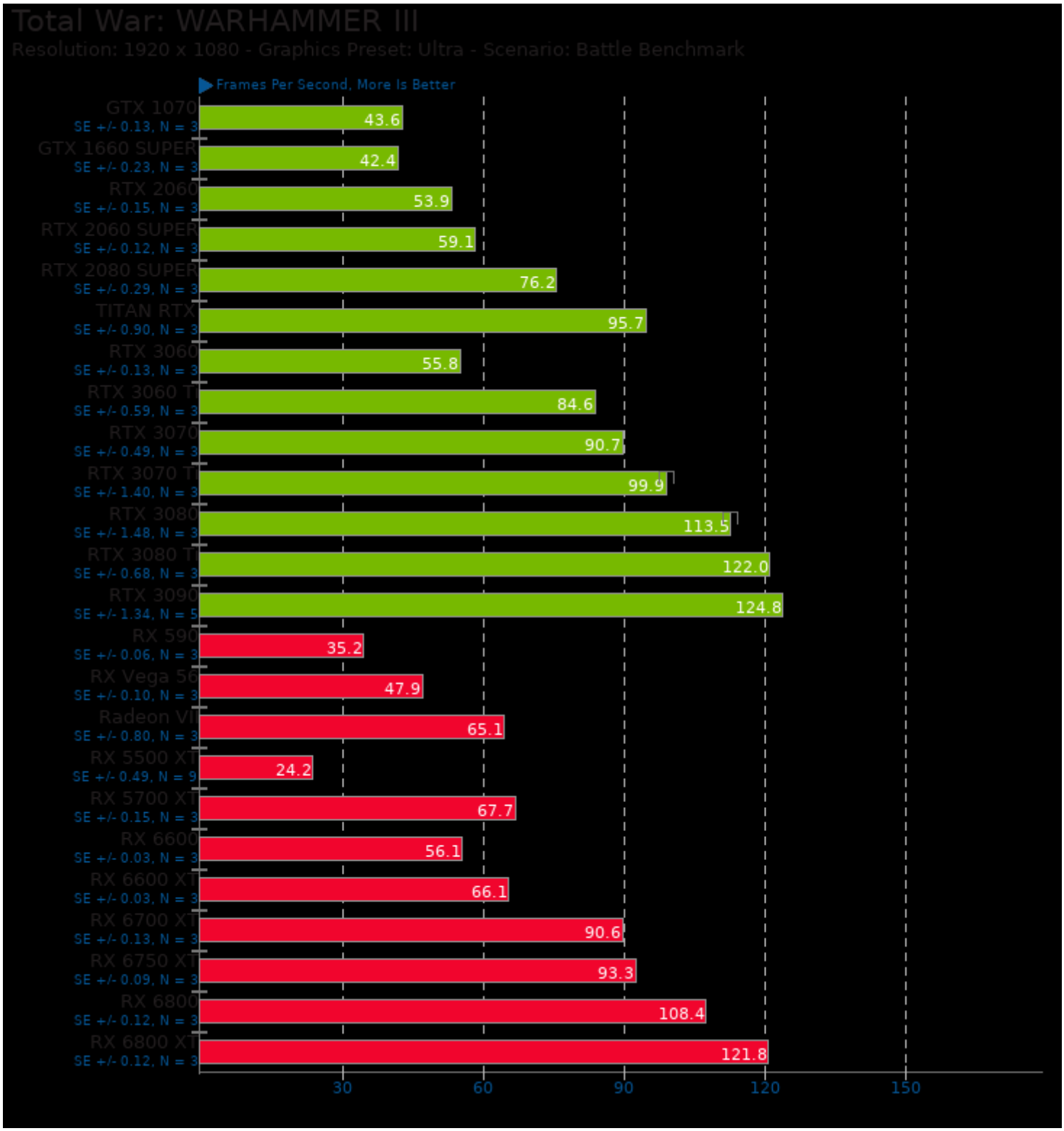
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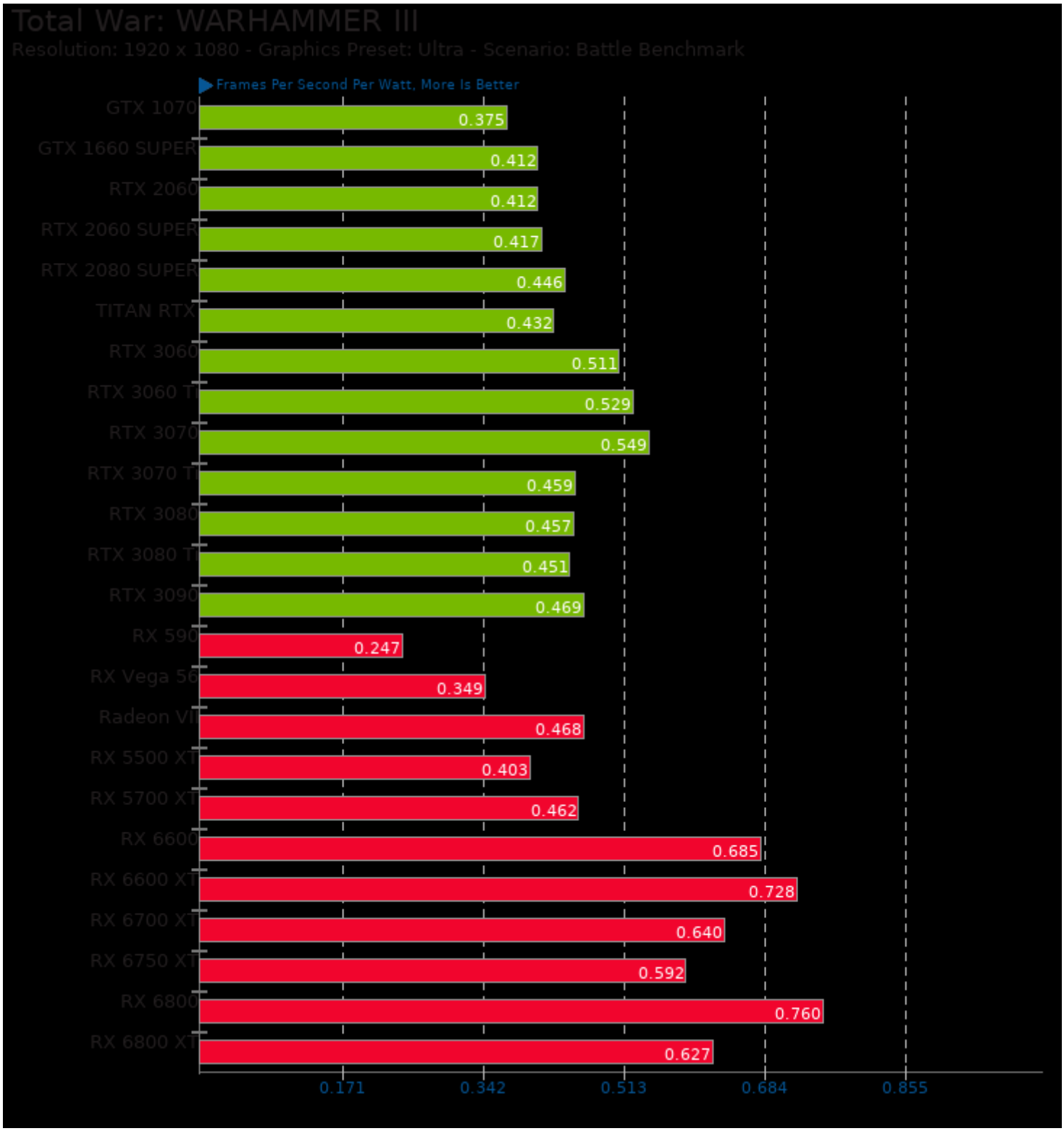
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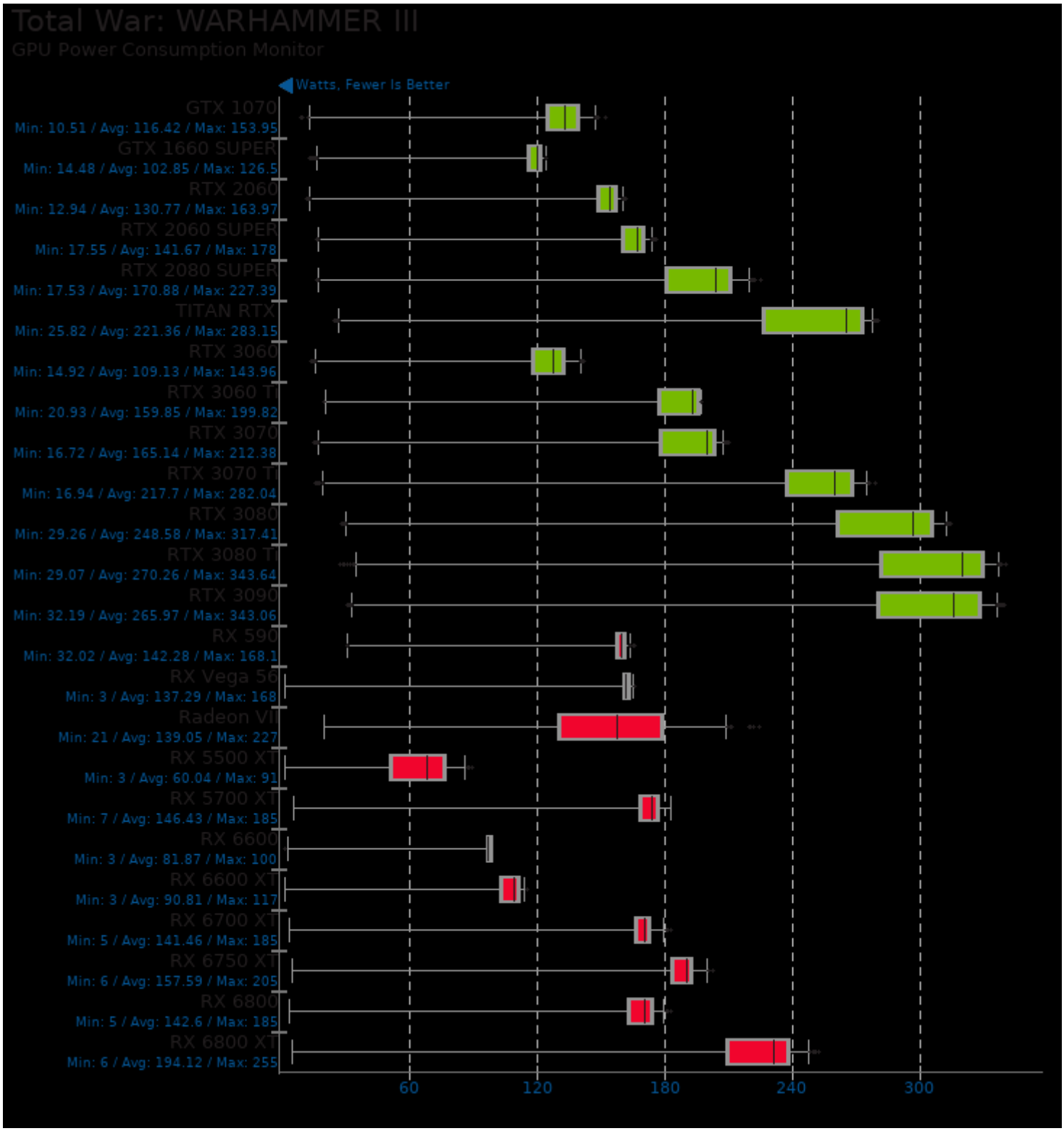
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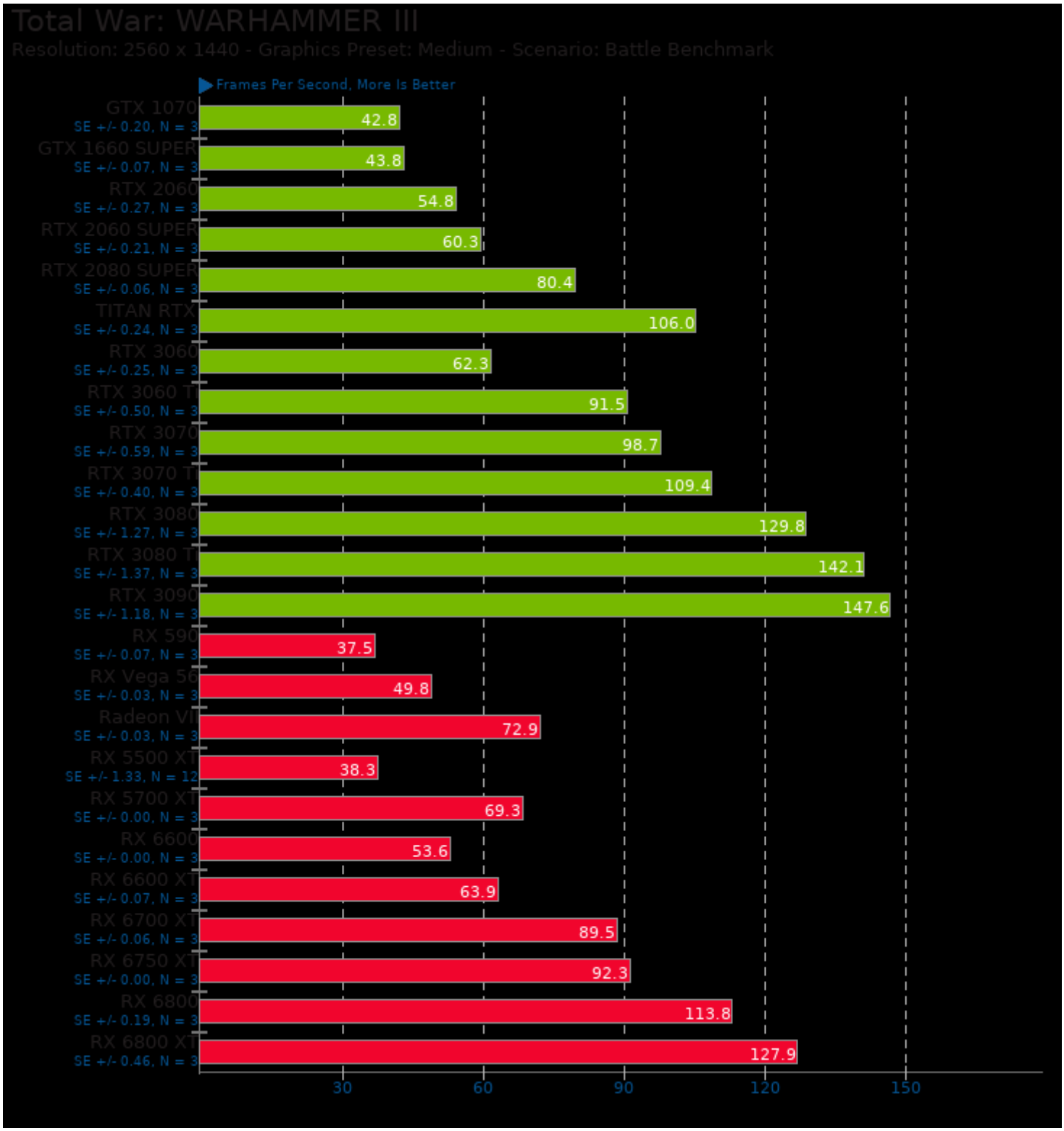
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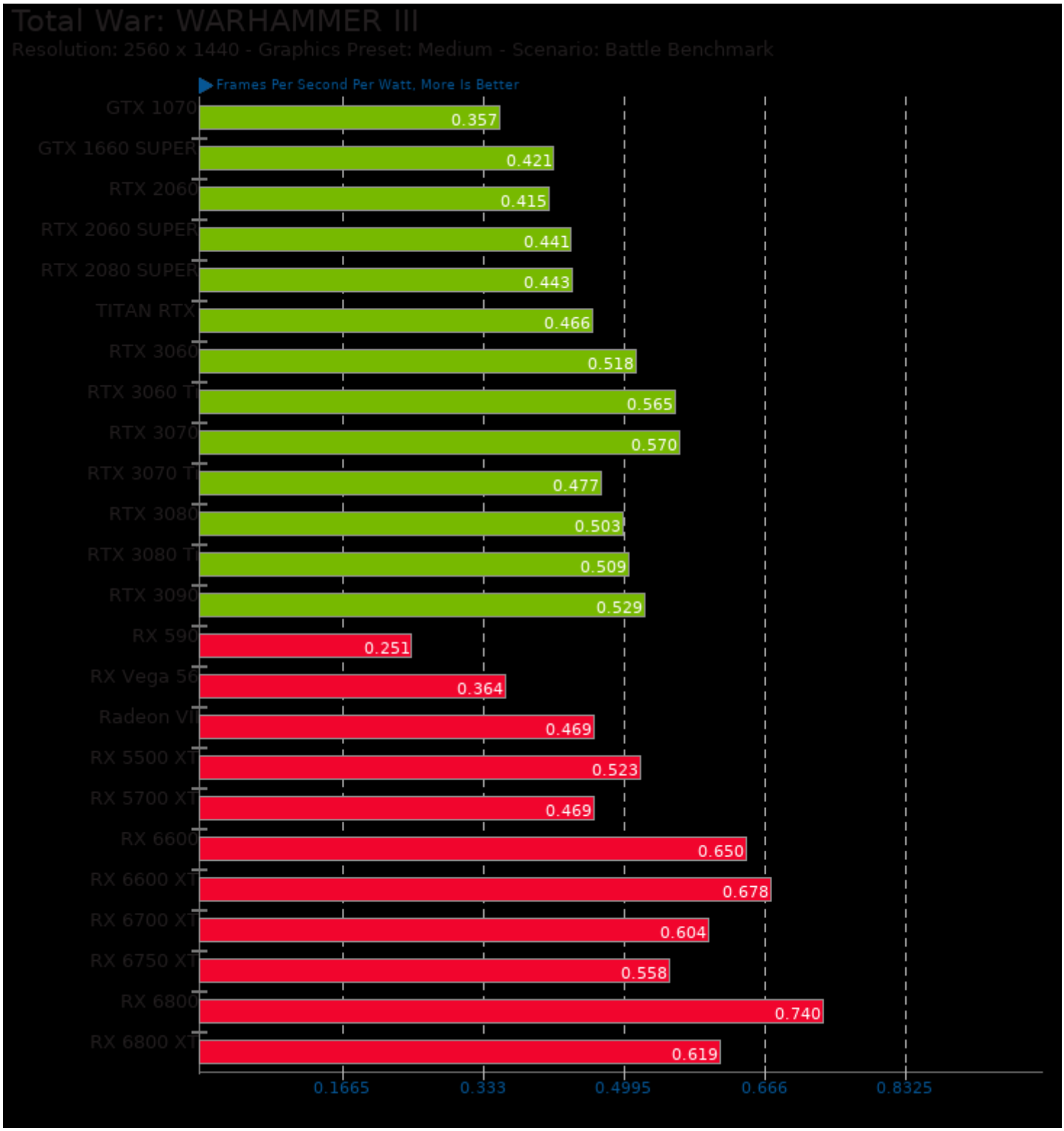
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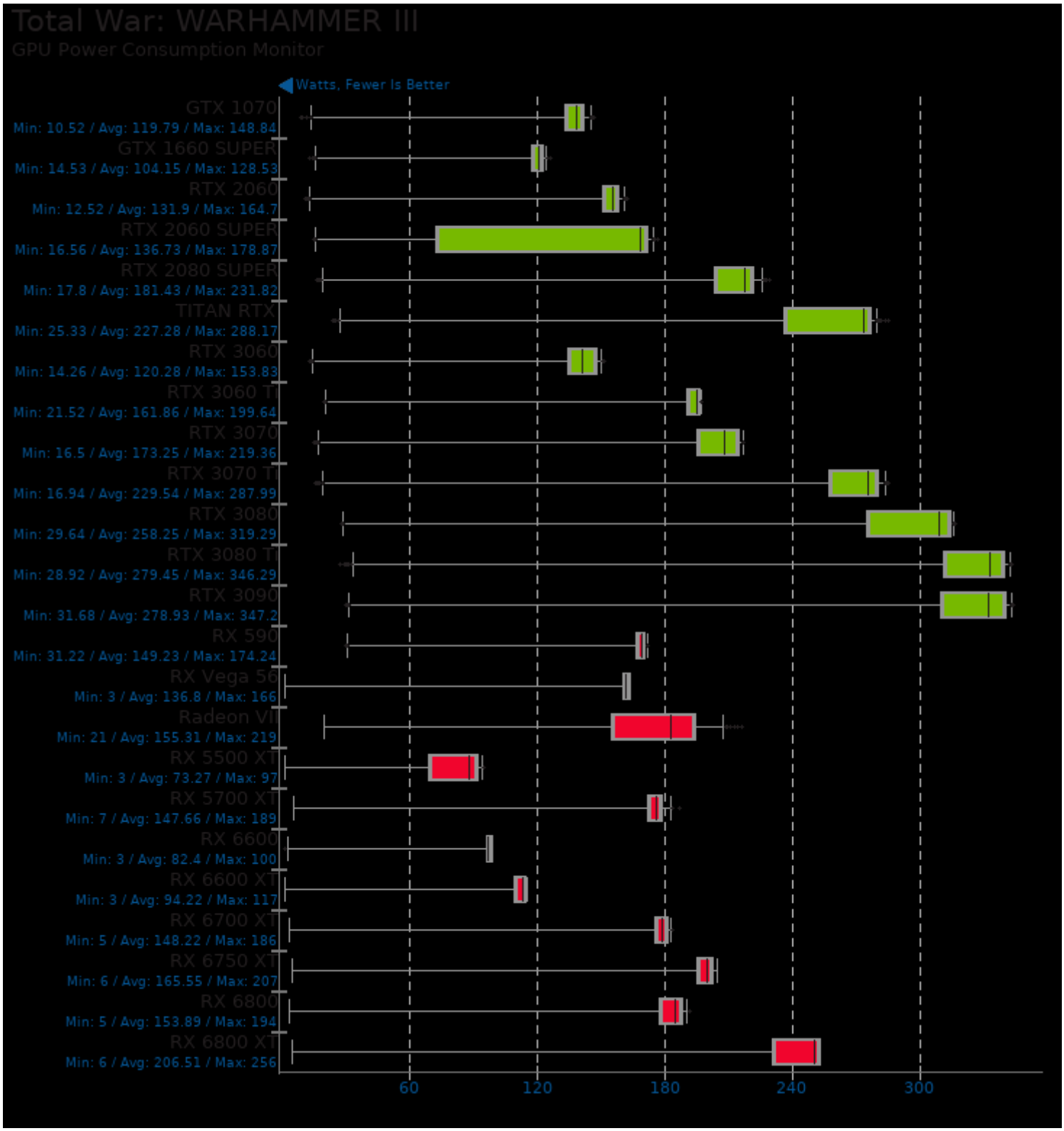
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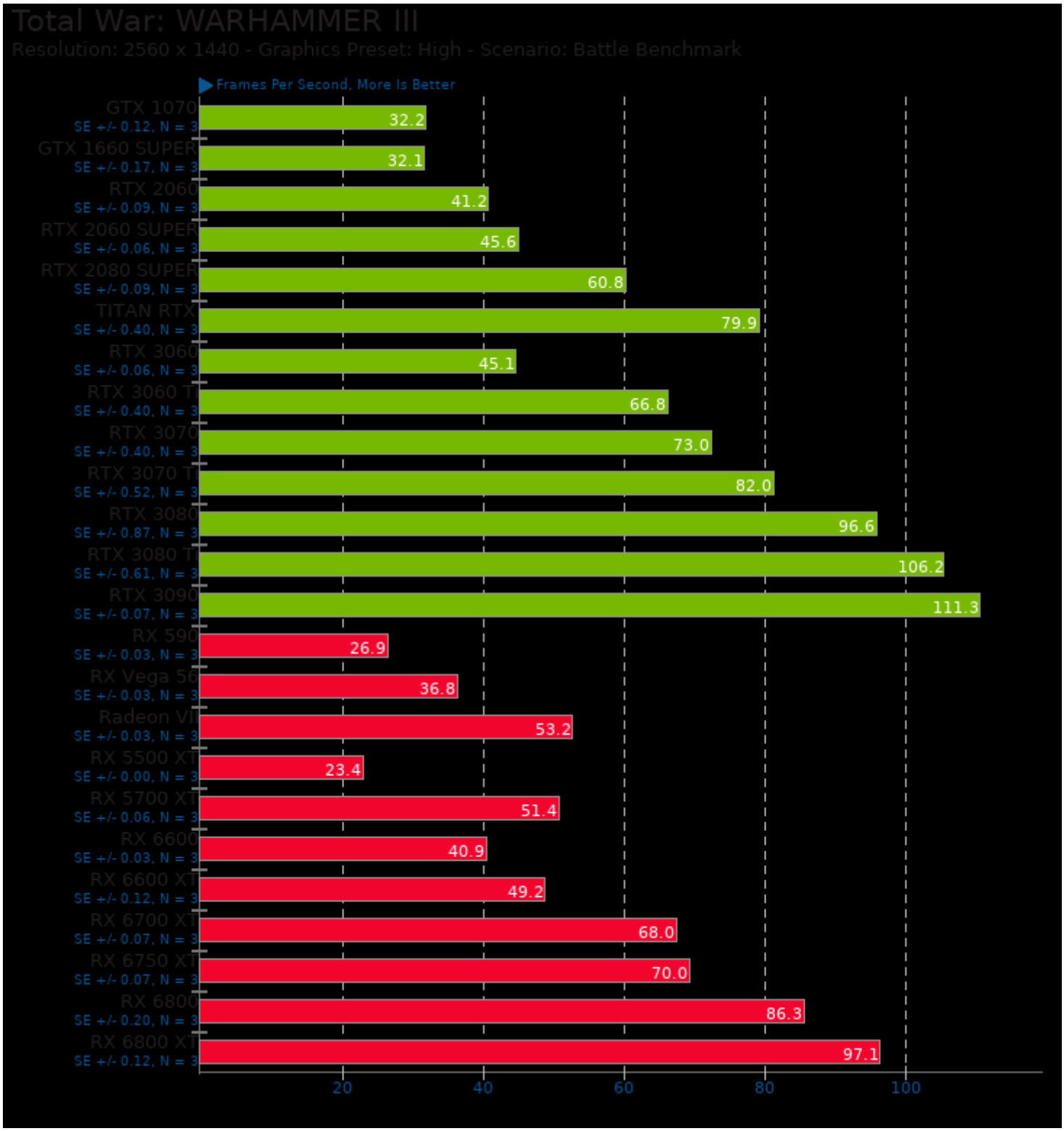
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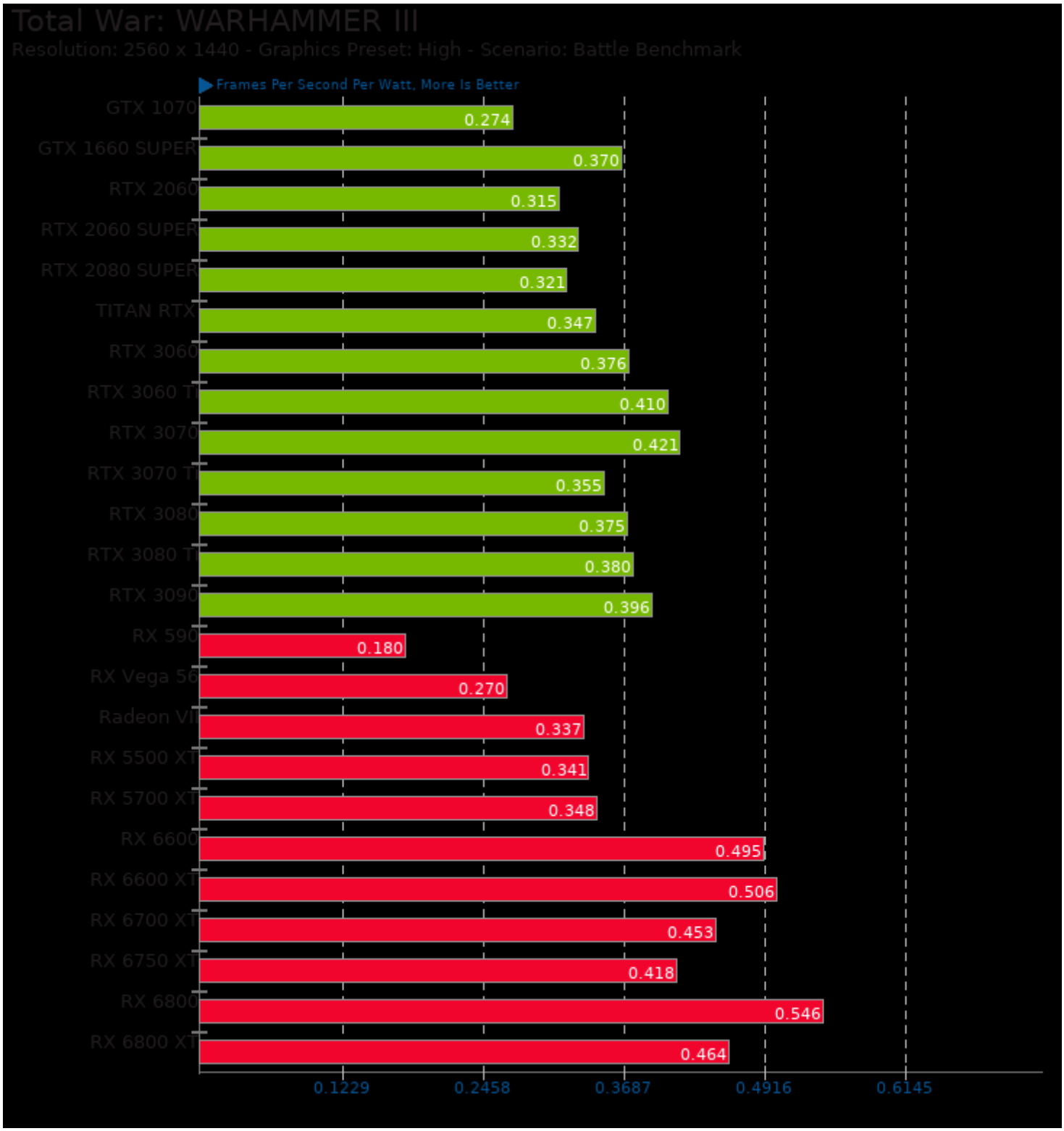
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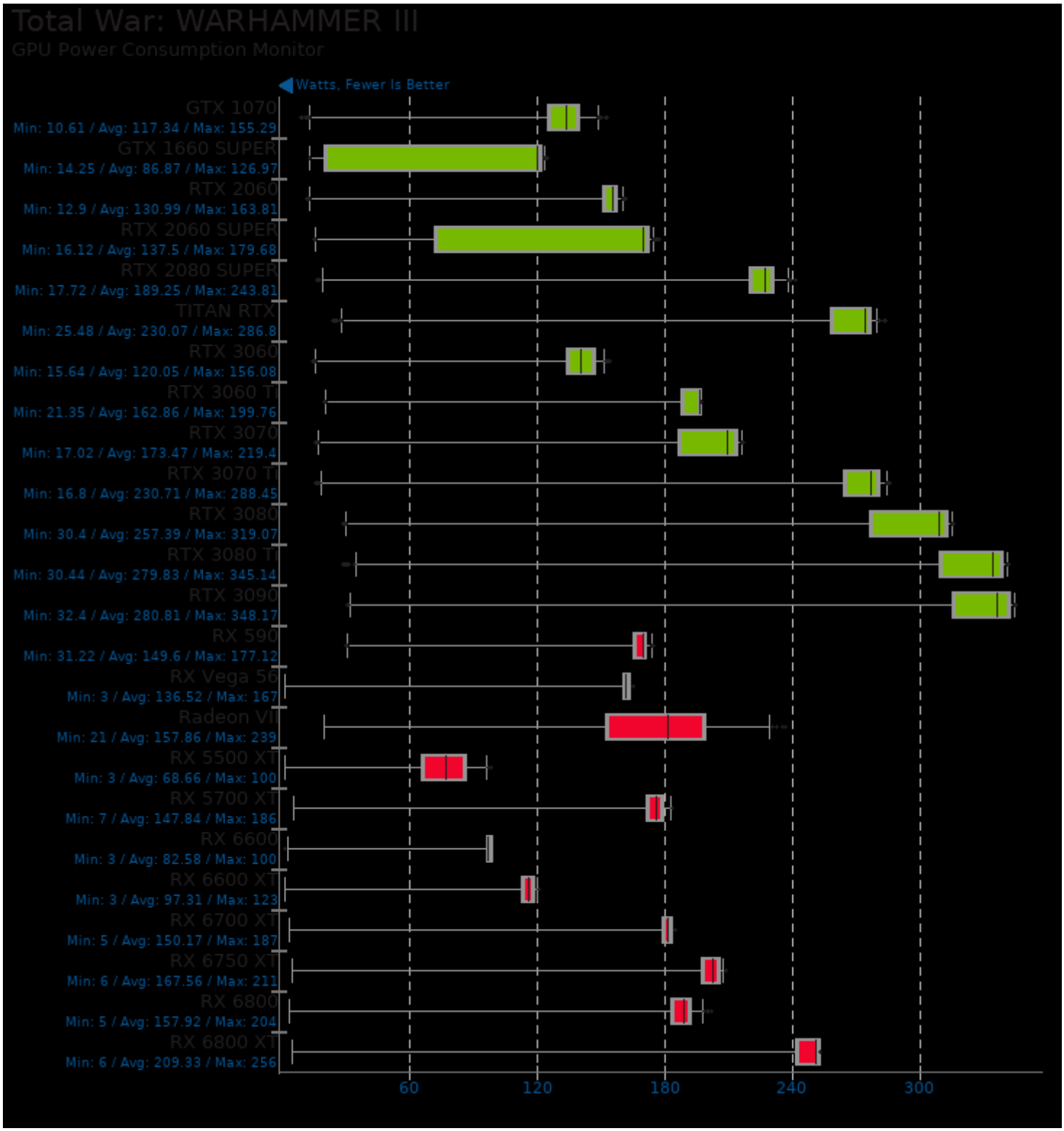
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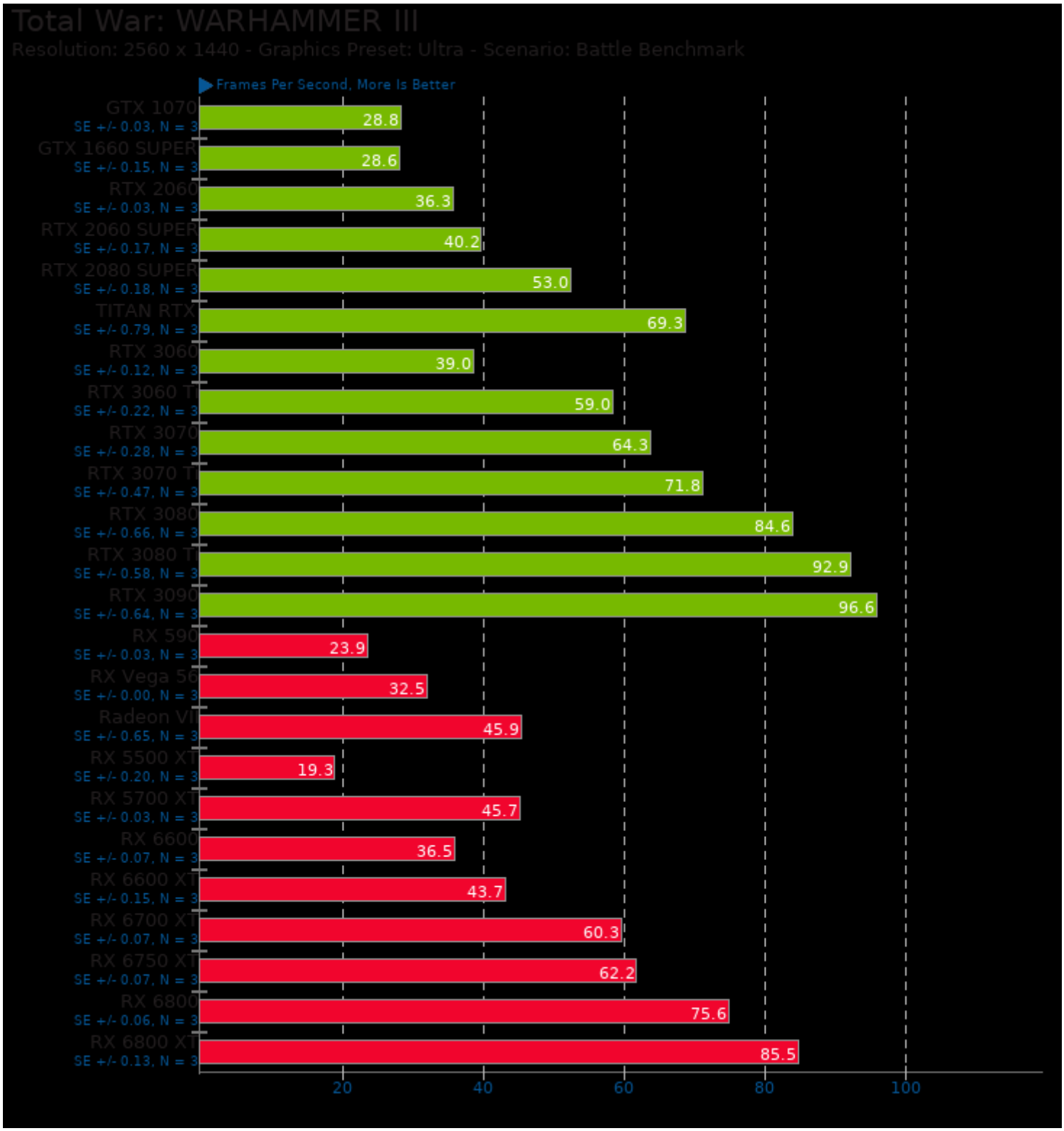
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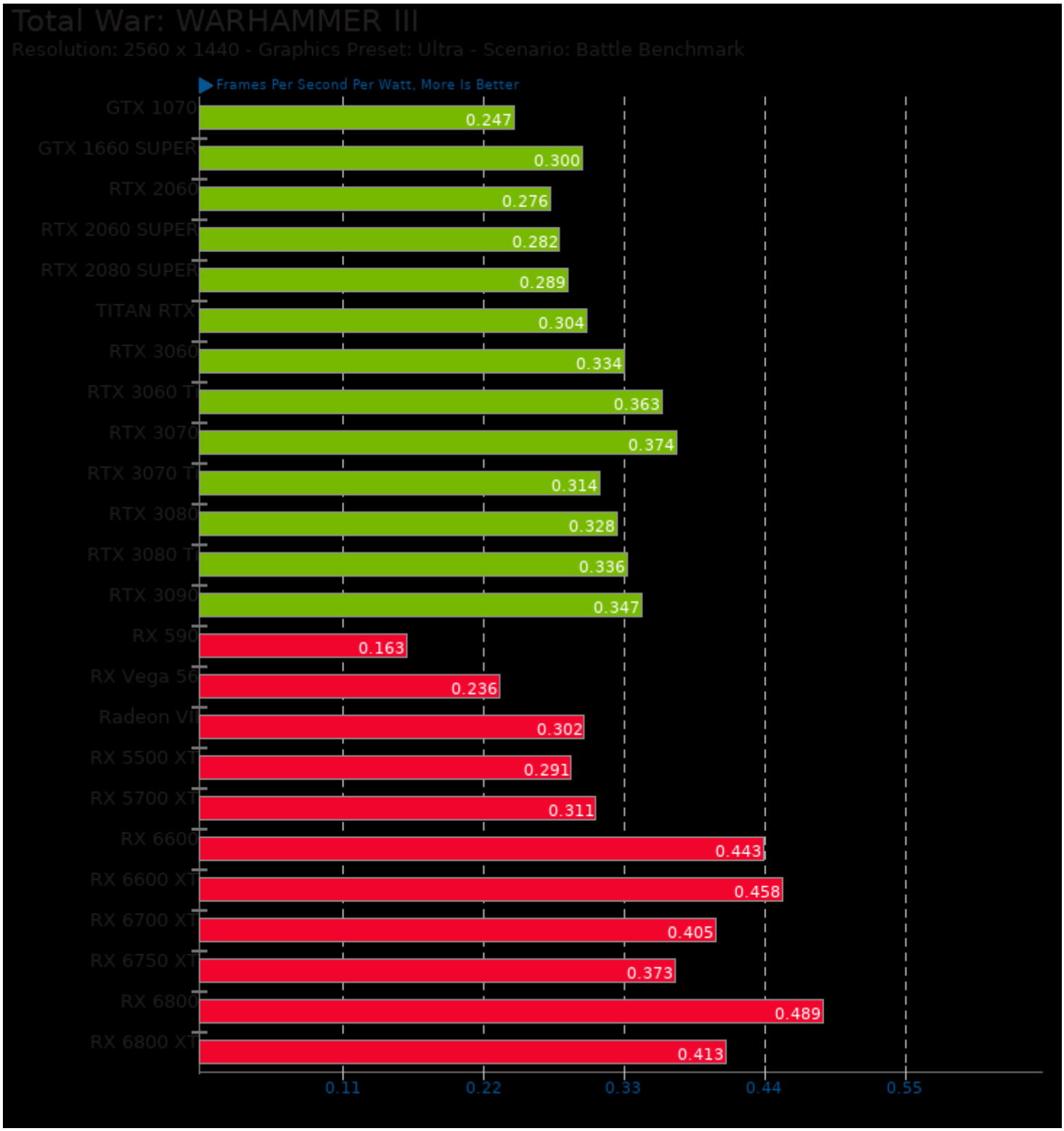
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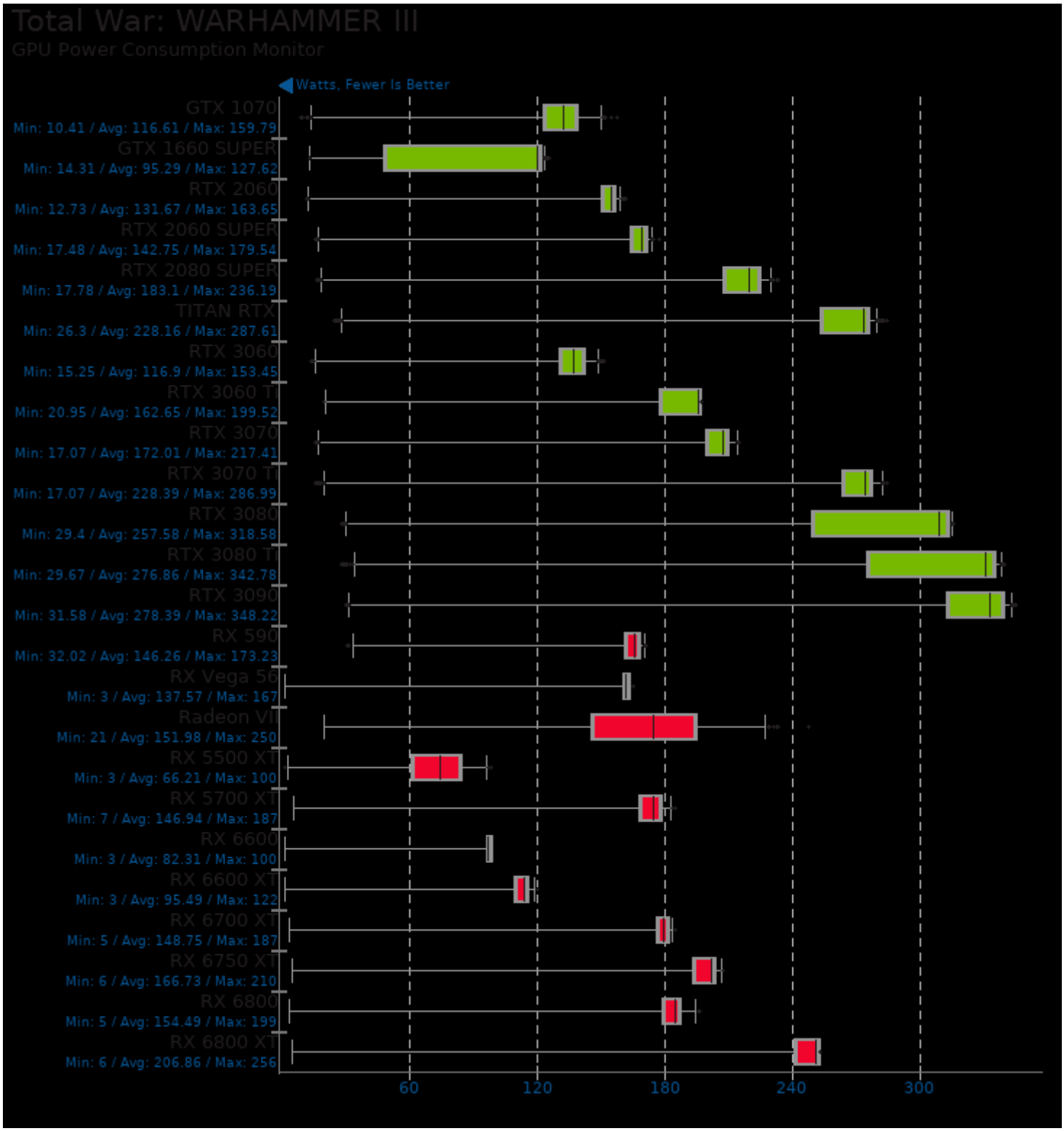
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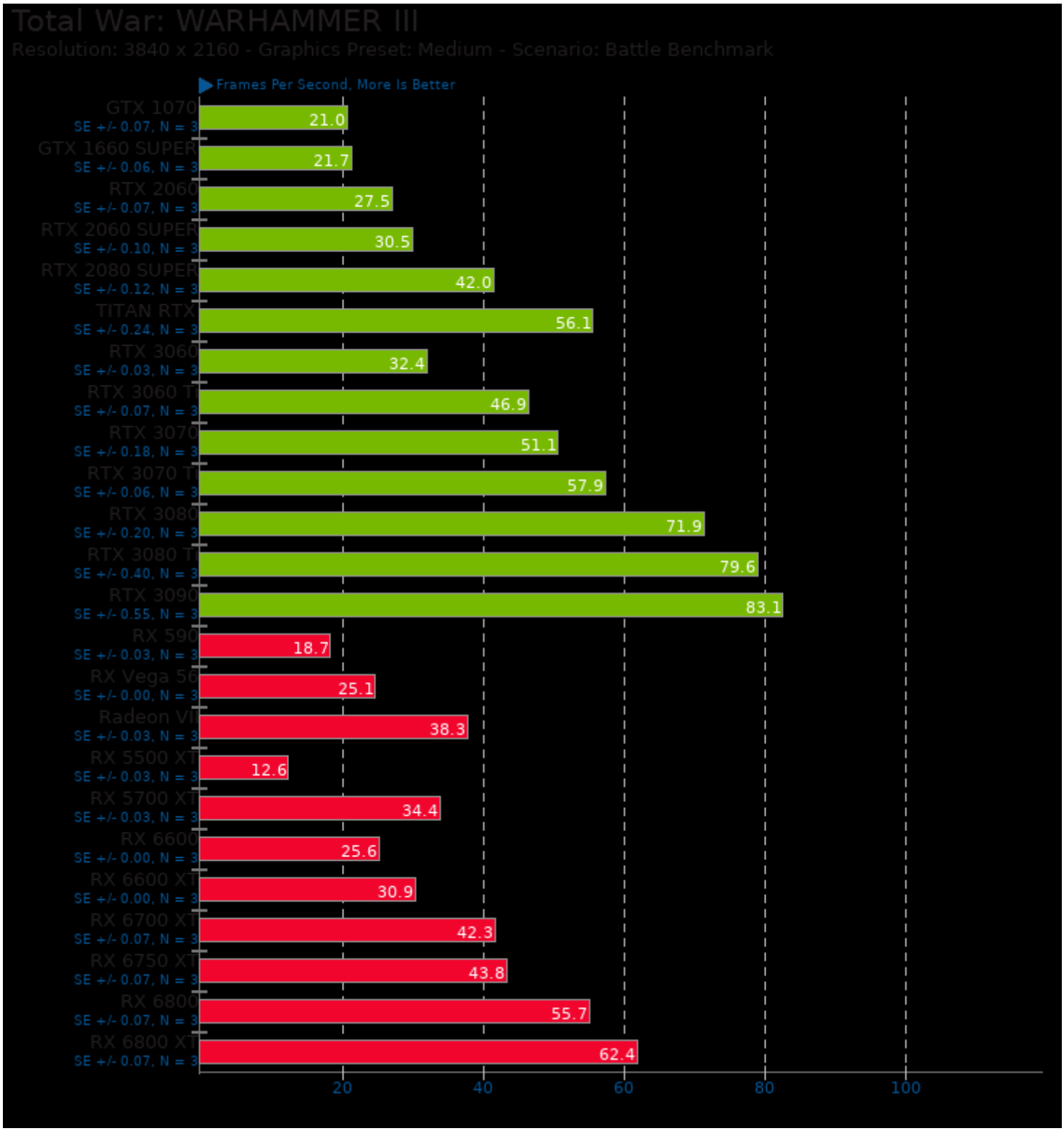
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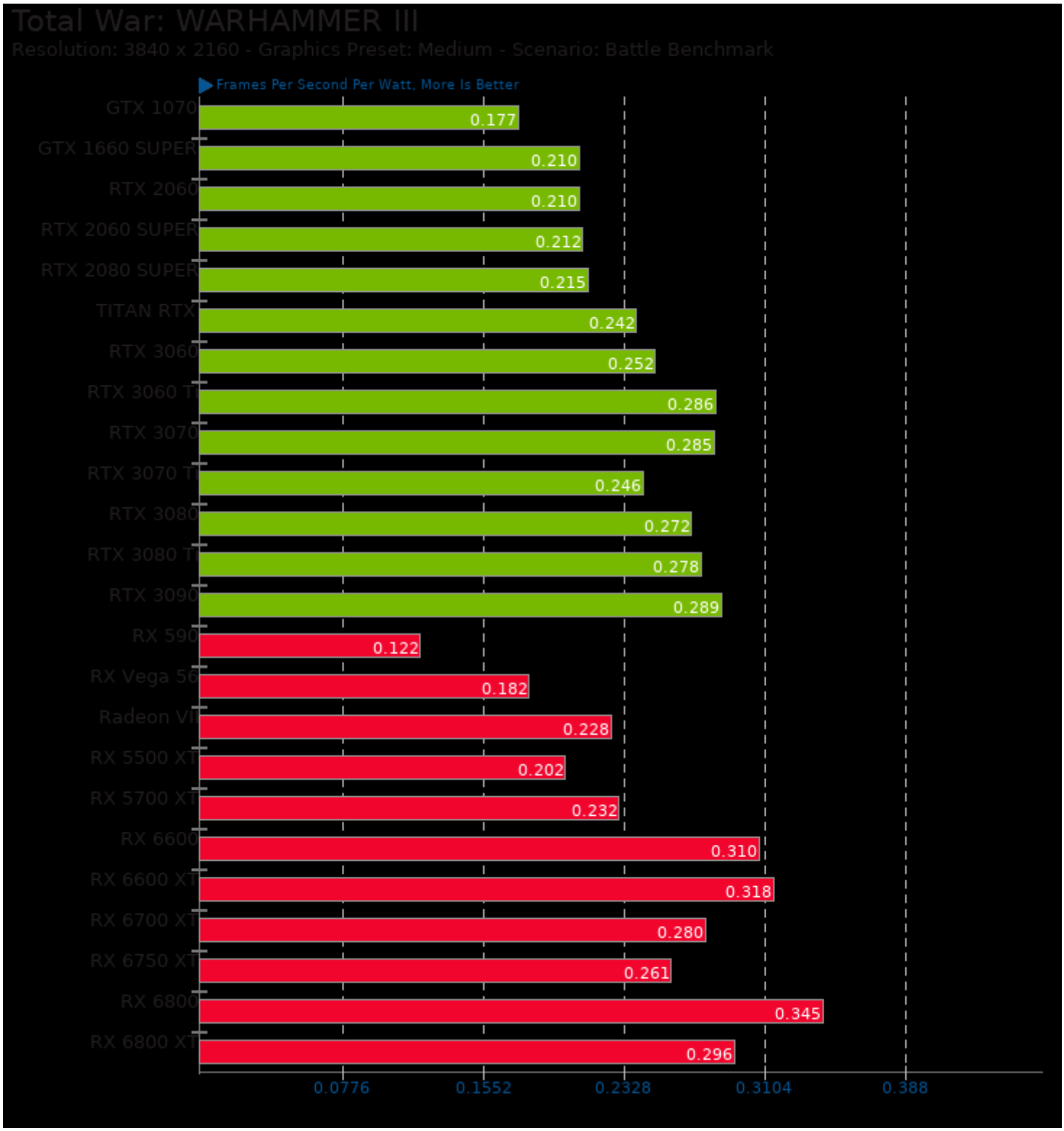
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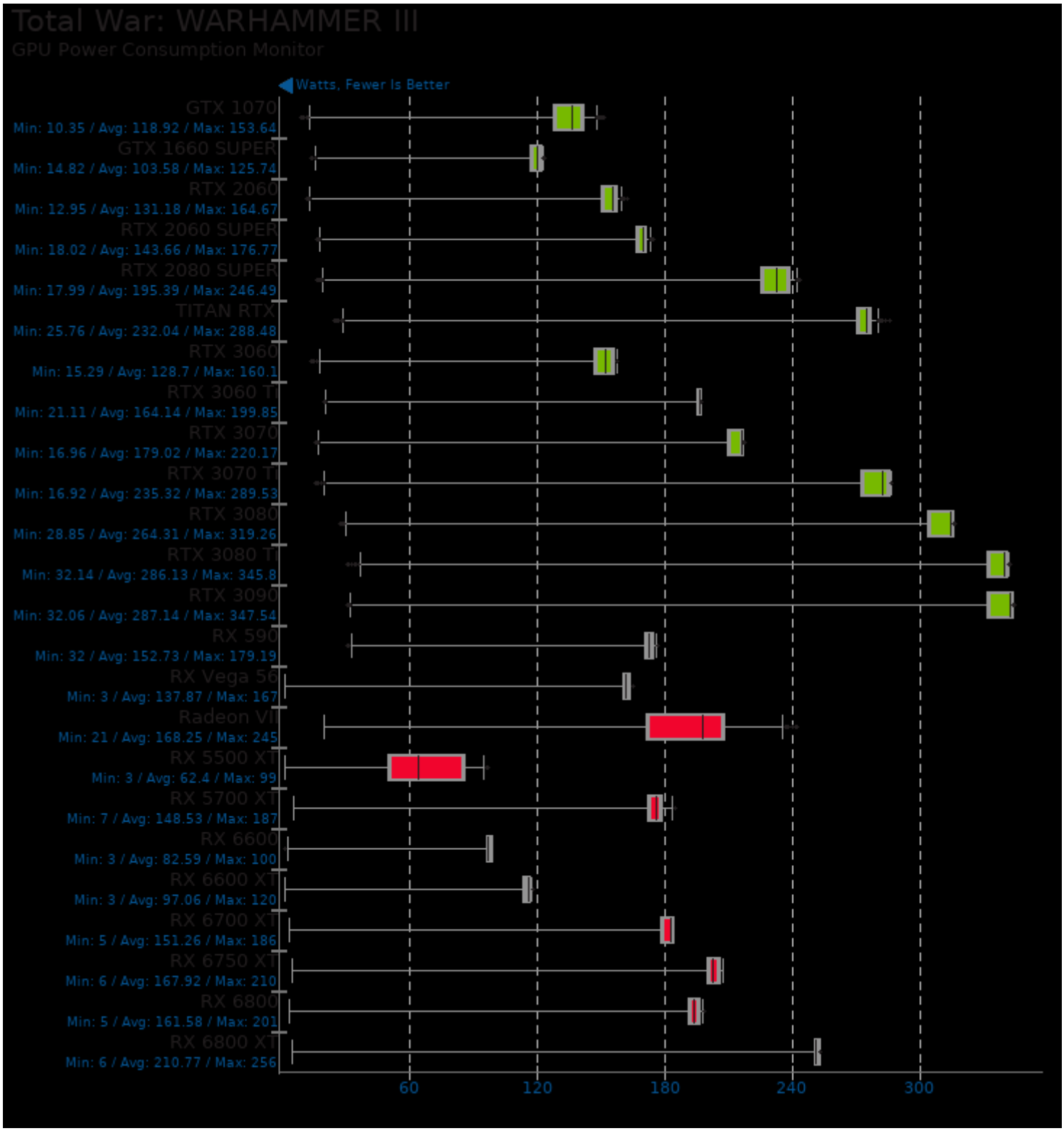
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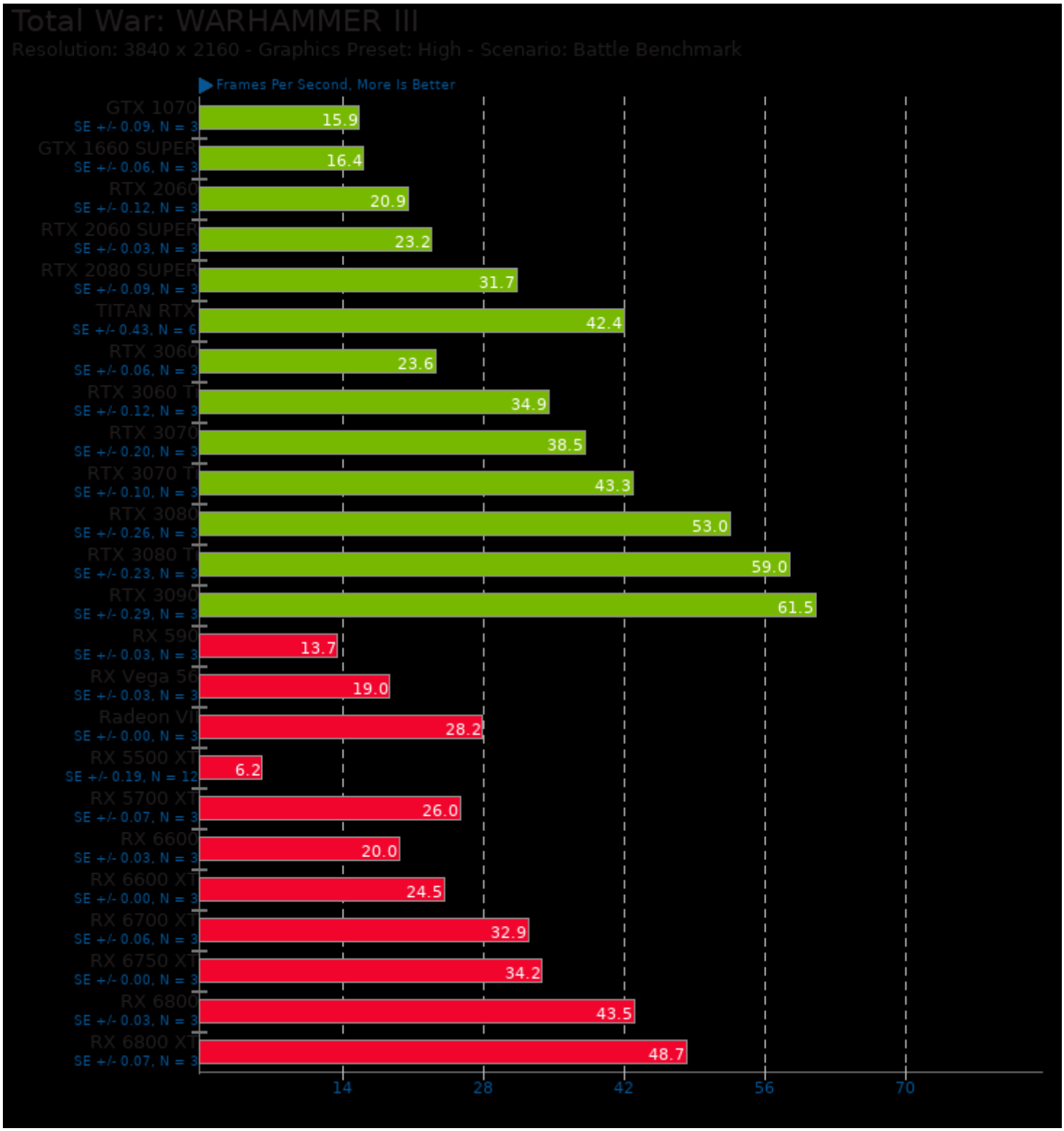
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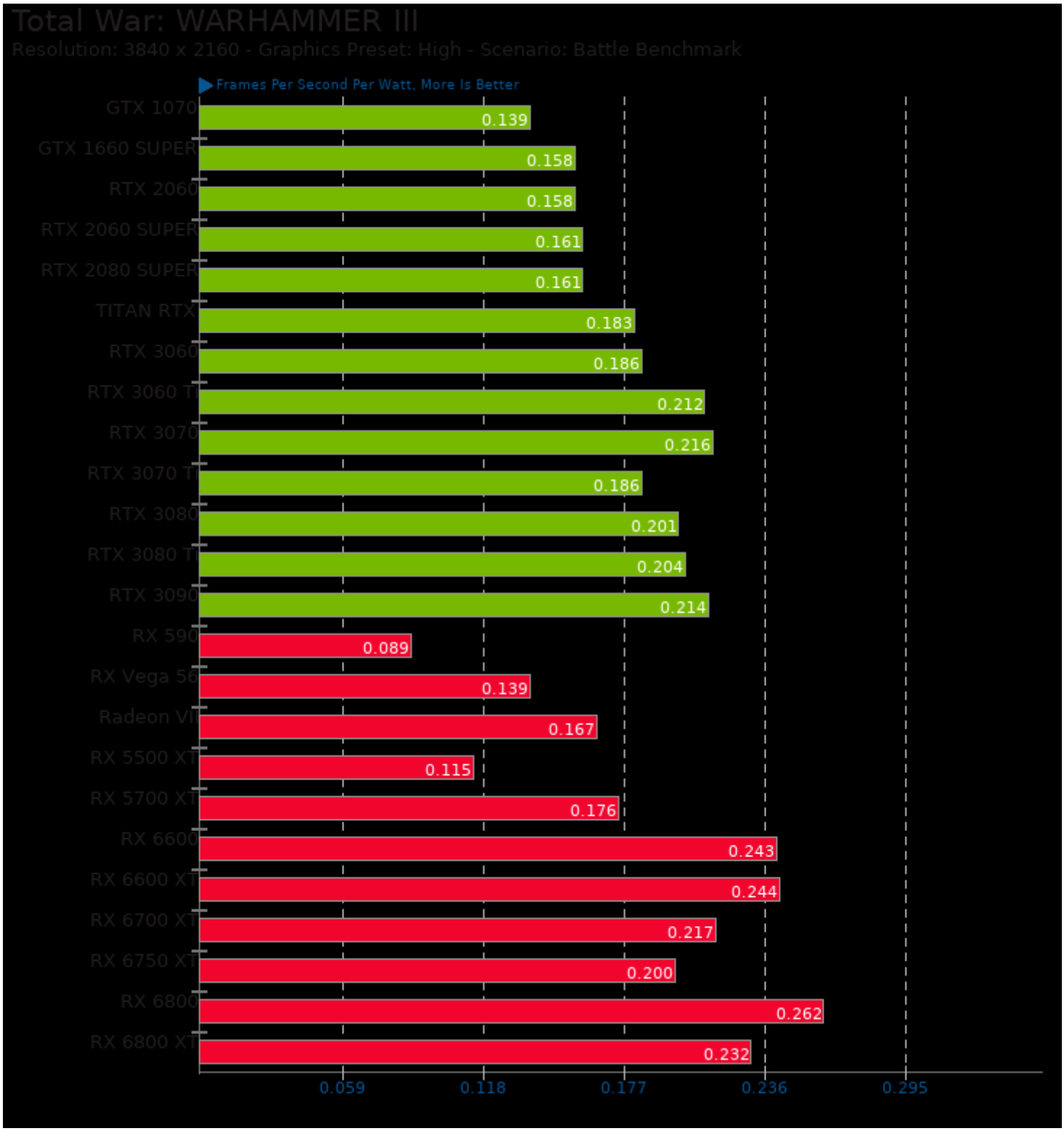
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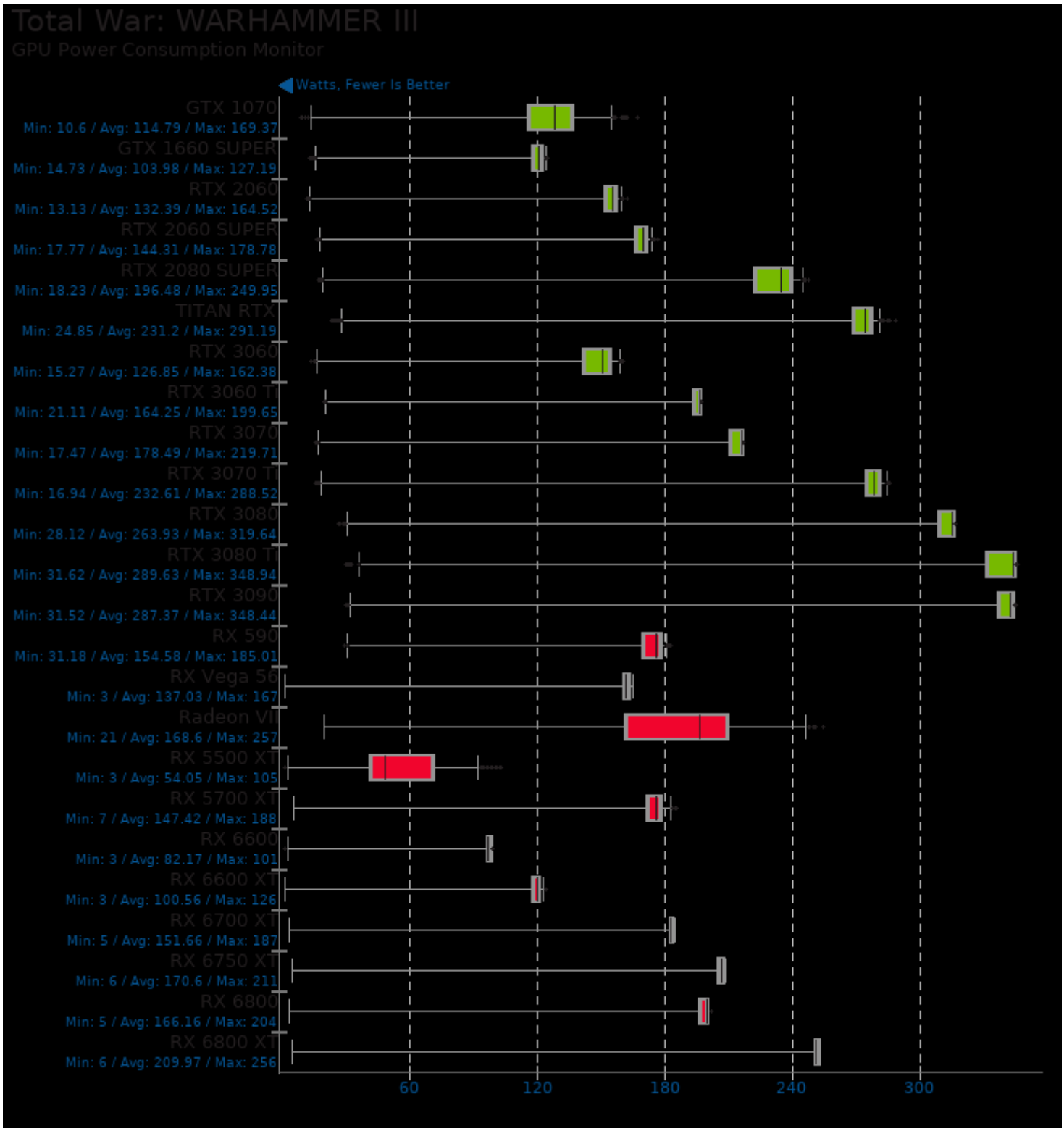
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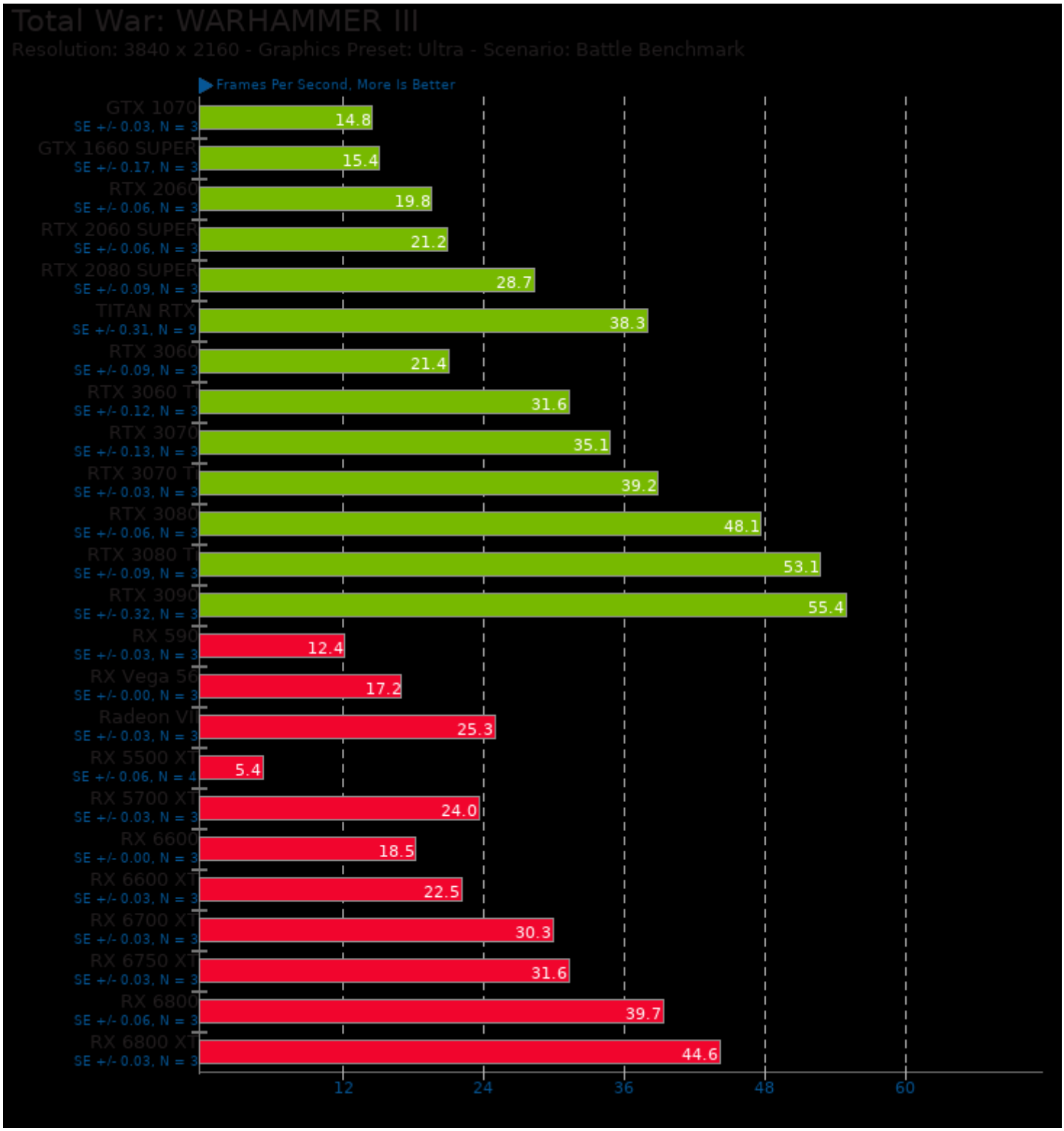
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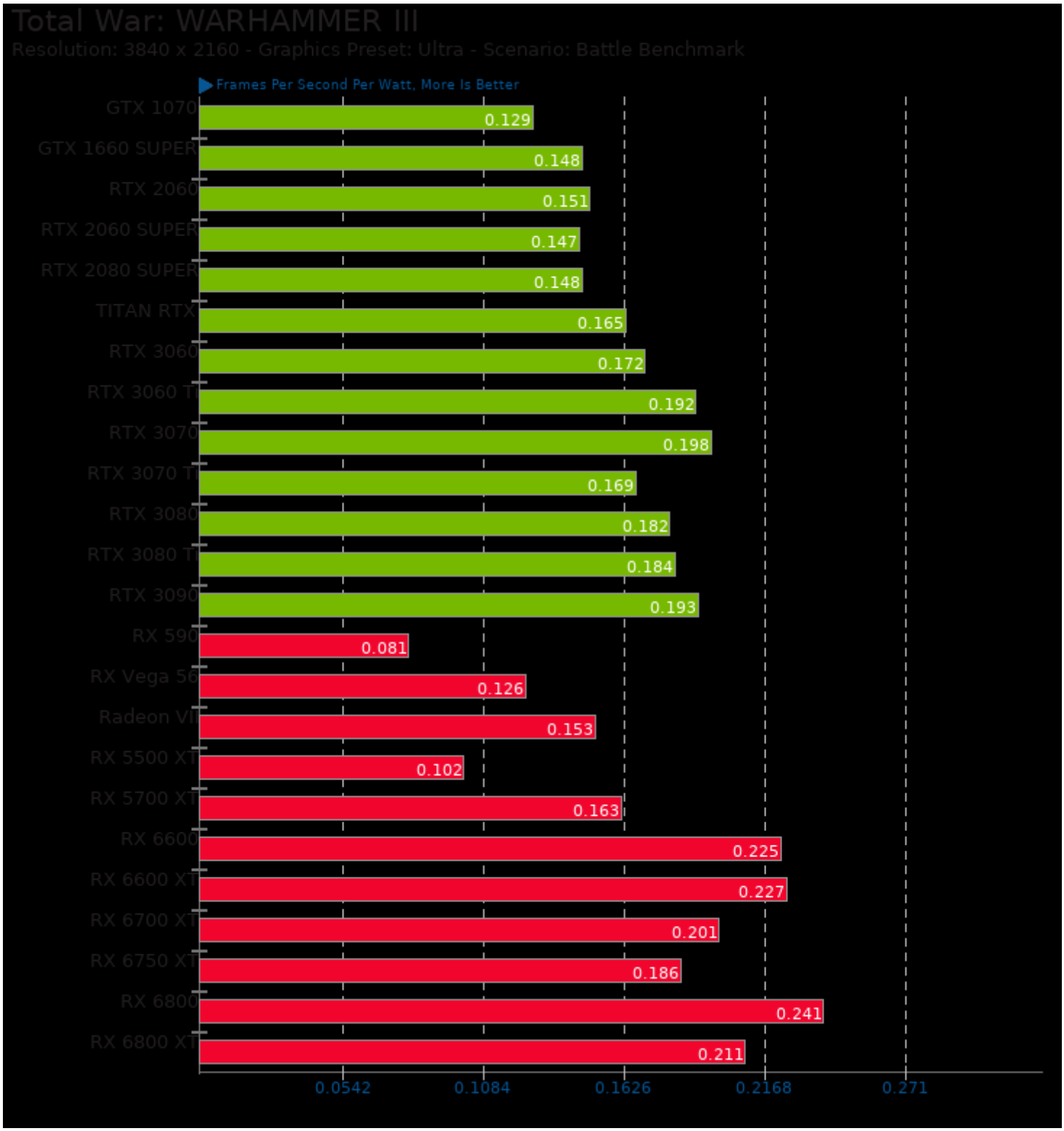
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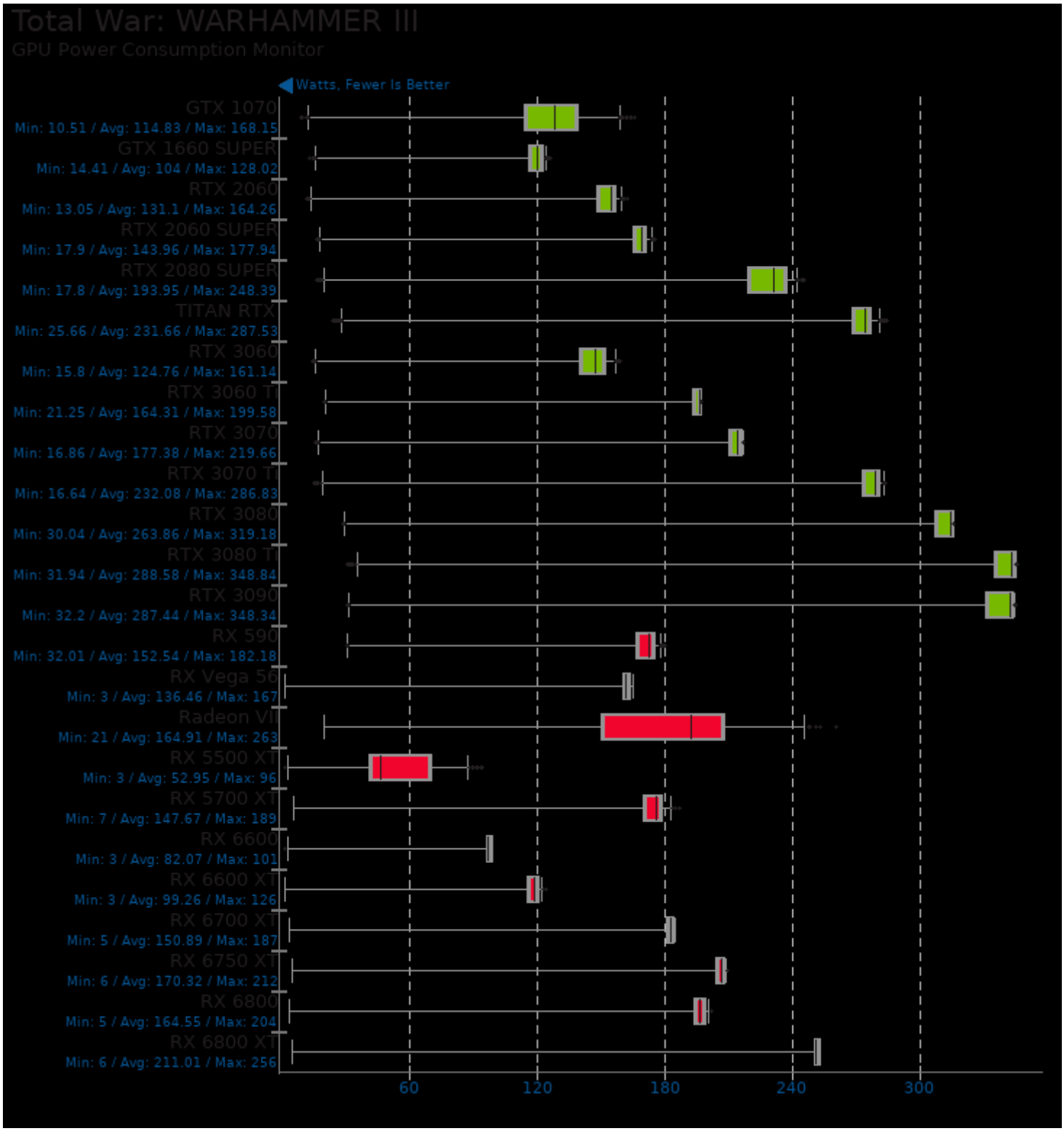
Total War: WARHAMMER III Linux Performance



Total War: WARHAMMER III Linux Performance



Total War: WARHAMMER III Linux Performance



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