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zstd broadwell

Intel Core i7-5775C testing with a ASUS Z97I-PLUS (2704 BIOS) and ASUS Intel Iris Pro 6200 on Ubuntu 20.04 via the Phoronix Test Suite.

Automated Executive Summary

stock with undervolt had the most wins, coming in first place for 91% of the tests.

Based on the geometric mean of all complete results, the fastest (stock with undervolt) was 1.046x the speed of the slowest (4). 2 was 0.958x the speed of stock with undervolt, 1 was 1x the speed of 2, 3 was 1x the speed of 1, 4 was 0.998x the speed of 3.

Test Systems:

1

2

3

4

Processor: Intel Core i7-5775C @ 3.70GHz (4 Cores / 8 Threads), Motherboard: MSI Z97-G45 GAMING (MS-7821) v1.0 (V2.9 BIOS), Chipset: Intel Broadwell-U DMI, Memory: 16GB, Disk: 120GB CT120BX100SSD1, Graphics: MSI Intel Iris Pro 6200 3GB (1150MHz), Audio: Intel Broadwell-U Audio, Monitor: DELL S2409W, Network: Qualcomm Atheros Killer E220x

OS: Ubuntu 18.10, Kernel: 5.0.0-999-generic (x86_64) 20190223, Desktop: GNOME Shell 3.30.2, Display Server: X Server 1.20.1, OpenGL: 4.5 Mesa 19.2.0-devel (git-2631fd3 2019-07-24 cosmic-oibaf-ppa), Vulkan: 1.1.102, Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

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++ --enable-libmpx --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate powersave - CPU Microcode: 0x20 - Thermald 1.7
Security Notes: l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + meltdown: Mitigation of PTI + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS_FW STIBP: conditional RSB filling

stock with undervolt

Processor: Intel Core i7-5775C @ 3.70GHz (4 Cores / 8 Threads), Motherboard: ASUS Z97I-PLUS (2704 BIOS), Chipset: Intel Broadwell-U DMI, Memory: 8GB, Disk: 128GB FCCT128M4SSD1, Graphics: ASUS Intel Iris Pro 6200 (1150MHz), Audio: Intel Broadwell-U Audio, Monitor: iScan Duo, Network: Intel I218-V

OS: Ubuntu 20.04, Kernel: 5.4.0-67-generic (x86_64), Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/usr,hsa --enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64 --with-arch-32=i686 --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32 --with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0x22 - Thermald 1.9.1
Security Notes: itlb_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion; VMX: vulnerable + mds: Vulnerable; SMT vulnerable + meltdown: Vulnerable + spec_store_bypass: Vulnerable + spectre_v1: Vulnerable: __user pointer sanitization and usercopy barriers only; no swapgs barriers + spectre_v2: Vulnerable IBPB: disabled STIBP: disabled + srbds: Vulnerable + tsx_async_abort: Vulnerable

	1	2	3	4	stock with undervolt
Zstd Compression - 3 - Compression Speed (MB/s)	1504	1508	1520	1512	1552
Normalized	96.89%	97.18%	97.95%	97.45%	100%
Standard Deviation	0.1%	0.2%	0.4%	0.2%	0.6%
Zstd Compression - 3 - D.S	2840	2838	2833	2838	2945
Normalized	96.45%	96.38%	96.21%	96.37%	100%
Standard Deviation	0.1%	0.1%	0.2%	0.2%	0.1%

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Zstd Compression - 8 - Compression Speed (MB/s)	346.9	348.1	345.7	**342.2**	**349.0**
Normalized	99.4%	99.74%	99.05%	98.05%	100%
Standard Deviation	0.6%	0.3%	0.7%	1.2%	0.5%
Zstd Compression - 8 - D.S	2901	**2883**	2895	2891	**3021**
Normalized	96.03%	95.42%	95.85%	95.7%	100%
Standard Deviation	0.2%	0.9%	0.1%	0.1%	0.2%
Zstd Compression - 19 - Compression Speed (MB/s)	21.5	21.5	21.3	**21.2**	**22.1**
Normalized	97.29%	97.29%	96.38%	95.93%	100%
Standard Deviation	0.5%	0%	1%	2.3%	0.7%
Zstd Compression - 19 - D.S (MB/s)	2637	2638	**2631**	2646	**2746**
Normalized	96.04%	96.05%	95.8%	96.36%	100%
Standard Deviation	0.2%	0.4%	0%	0.1%	0.6%
Zstd Compression - 3, Long Mode - Compression Speed	**788.4**	798.9	795.8	793.6	**952.2**
Normalized	82.8%	83.9%	83.57%	83.34%	100%
Standard Deviation	1.4%	0.9%	1.8%	1.6%	0.5%
Zstd Compression - 3, Long Mode - D.S (MB/s)	**2972**	2973	3000	2993	**3108**
Normalized	95.61%	95.64%	96.51%	96.28%	100%
Standard Deviation	0.9%	1.1%	0%	0.4%	0.1%
Zstd Compression - 8, Long Mode - Compression Speed	359.4	358.9	**359.8**	**358.6**	**358.6**
Normalized	99.89%	99.75%	100%	99.67%	99.67%
Standard Deviation	0.3%	0.5%	0.6%	0.2%	0.8%
Zstd Compression - 8, Long Mode - D.S (MB/s)	3072	**3066**	3070	3075	**3199**
Normalized	96.04%	95.85%	95.95%	96.13%	100%
Standard Deviation	0.2%	0.3%	0.4%	0.3%	0.3%
Zstd Compression - 19, Long Mode - Compression Speed	18.5	18.4	**18.3**	**18.3**	**19.1**
Normalized	96.86%	96.34%	95.81%	95.81%	100%
Standard Deviation	0%	0.6%	0.9%	1.1%	1%
Zstd Compression - 19, Long Mode - D.S (MB/s)	2685	**2680**	2682	2689	**2767**
Normalized	97.07%	96.89%	96.95%	97.2%	100%
Standard Deviation	0.2%	0.8%	0.3%	0.3%	0.7%

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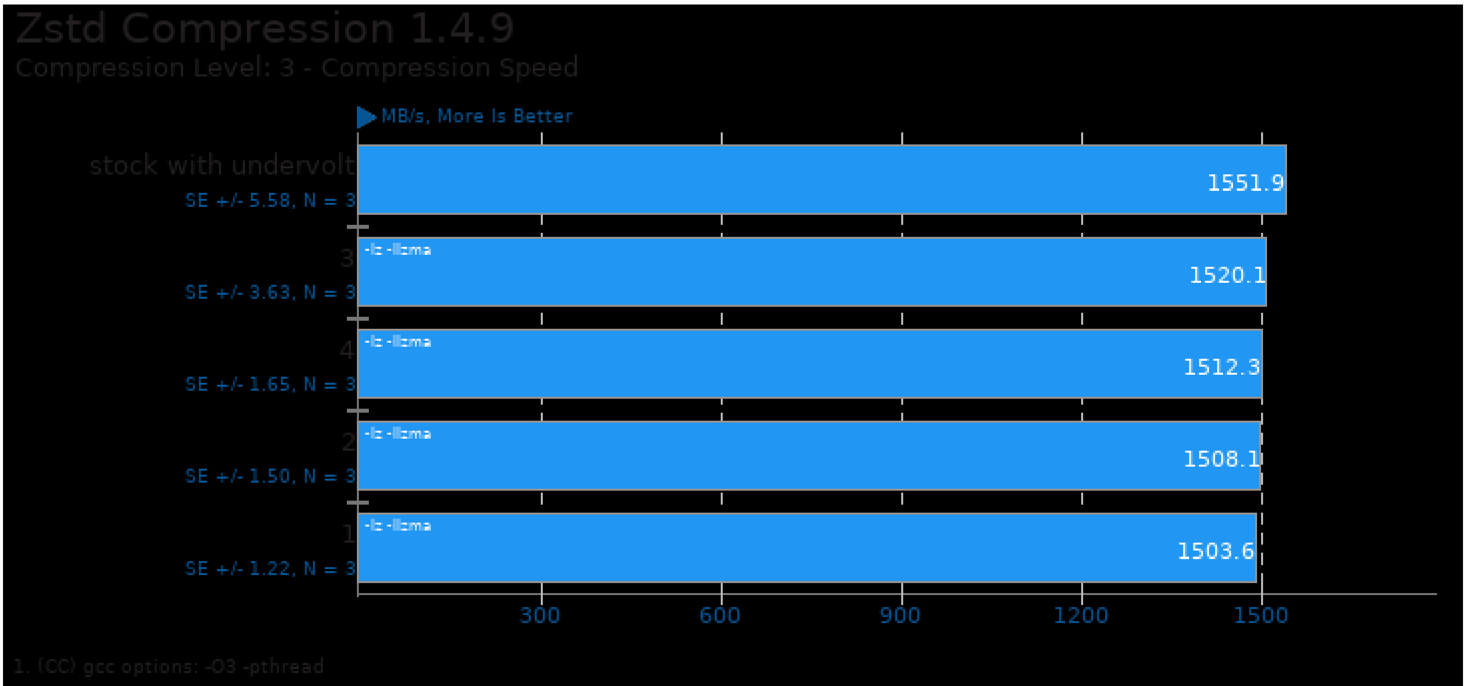

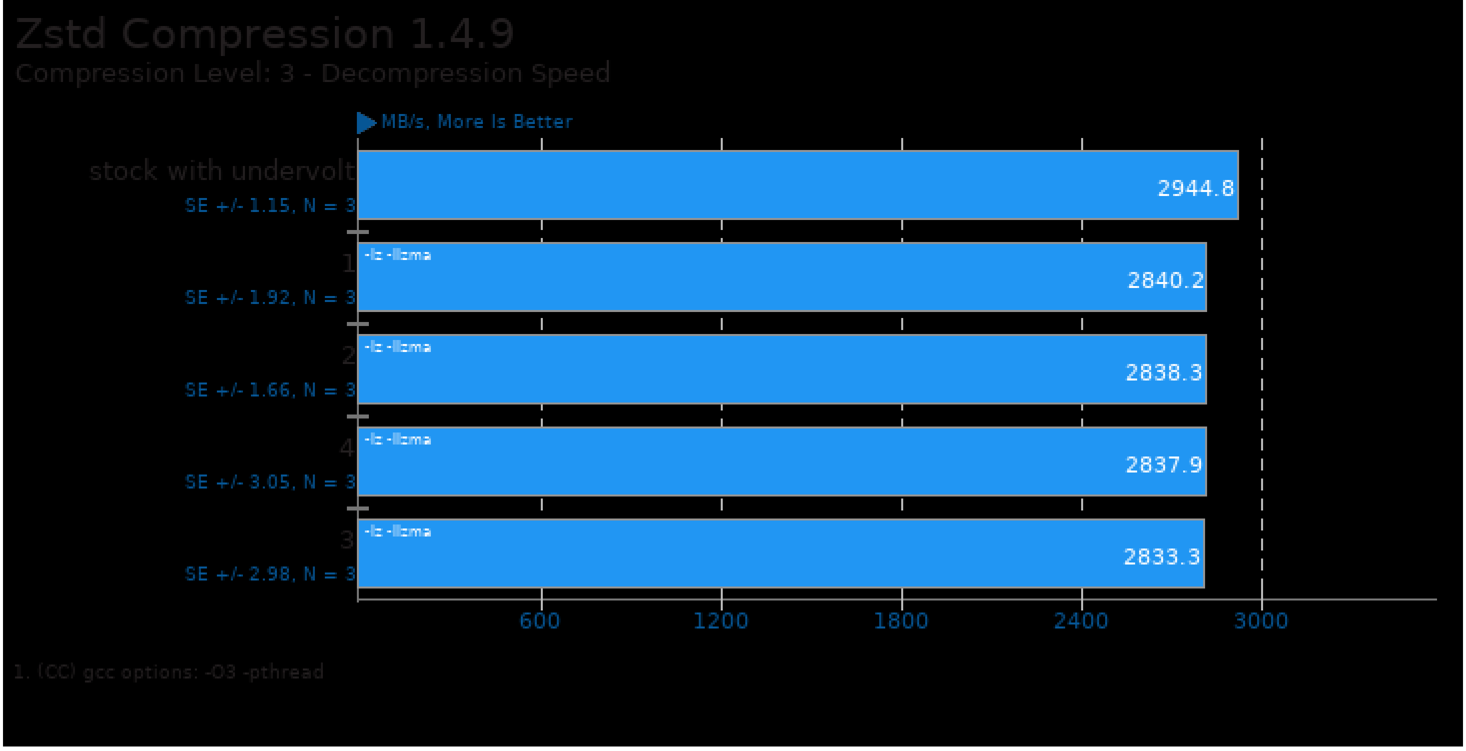

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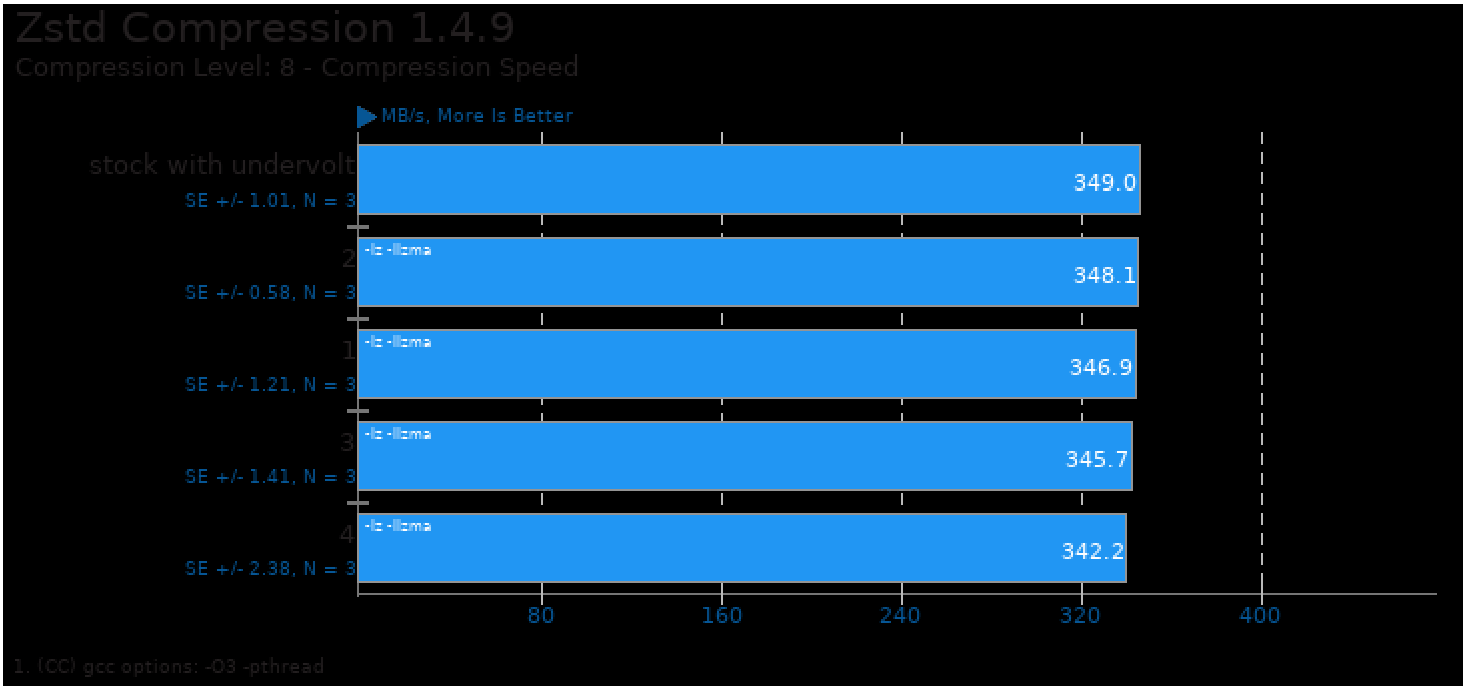

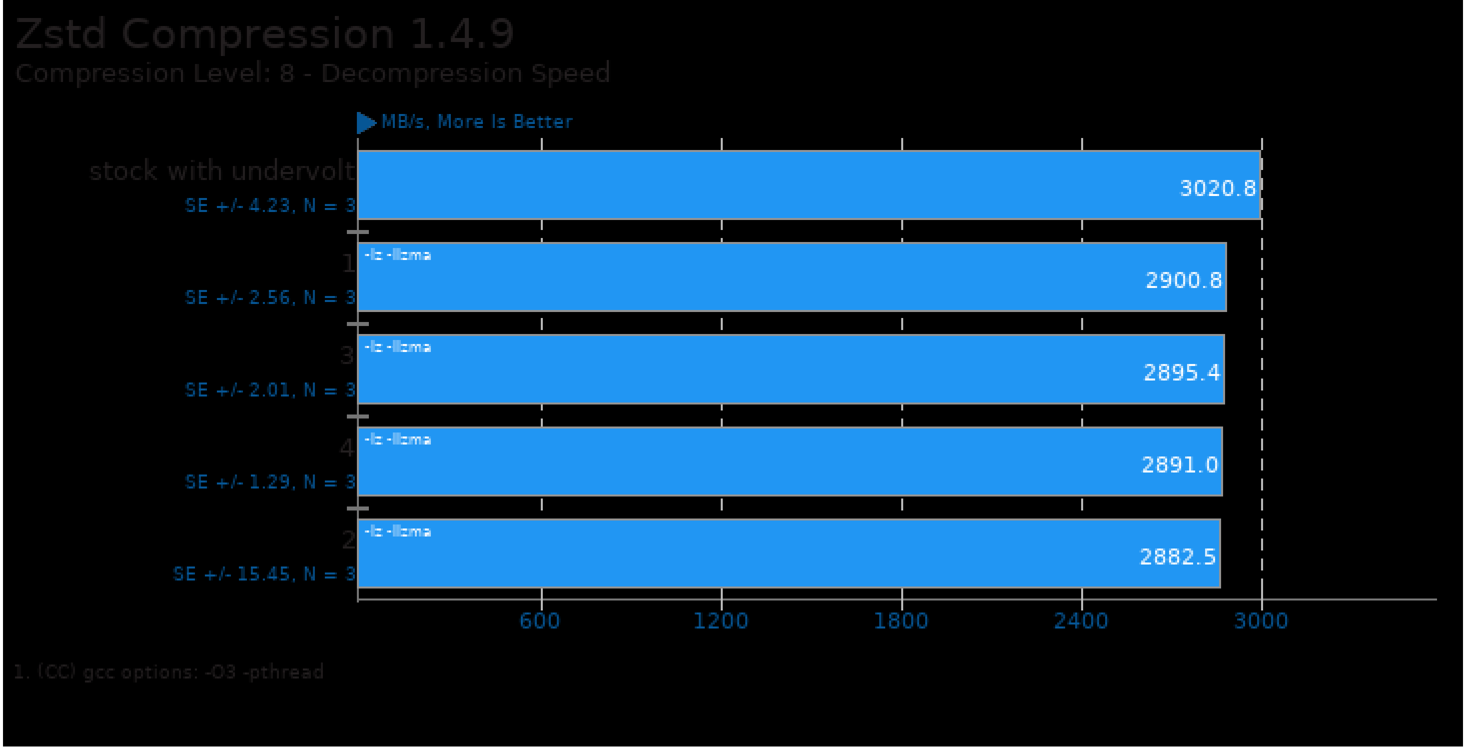

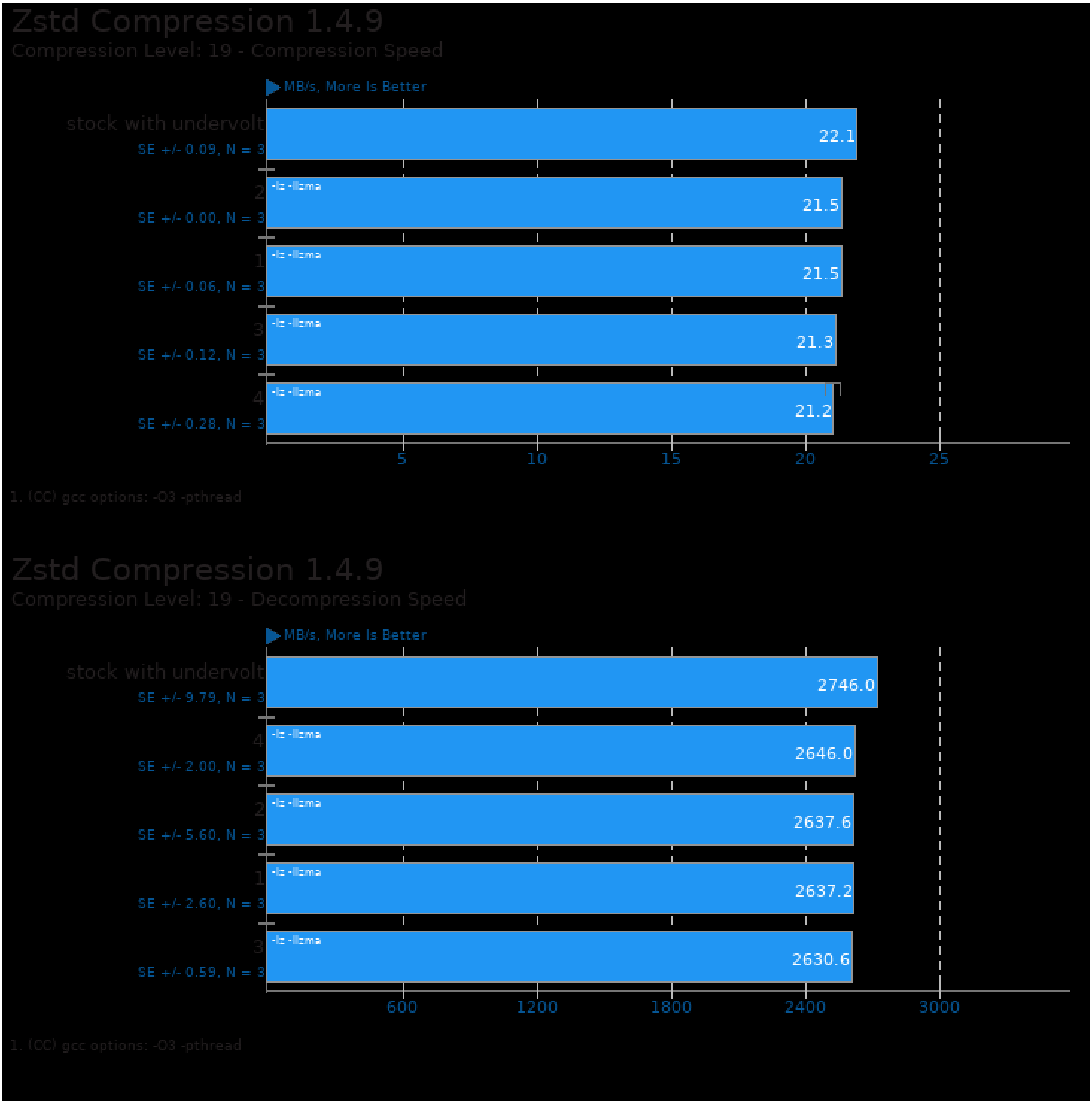

Zstd Compression 1.4.9
Compression Level: 19 - Compression Speed
MB/s, More Is Better
stock with undervolt
SE +/- 0.09, N = 3
22.1
2
SE +/- 0.00, N = 3
-lz -llzma
21.5
1
SE +/- 0.06, N = 3
-lz -llzma
21.5
3
SE +/- 0.12, N = 3
-lz -llzma
21.3
4
SE +/- 0.28, N = 3
-lz -llzma
21.2
5
10
15
20
25
1. (CC) gcc options: -O3 -pthread
Zstd Compression 1.4.9
Compression Level: 19 - Decompression Speed
MB/s, More Is Better
stock with undervolt
SE +/- 9.79, N = 3
2746.0
4
SE +/- 2.00, N = 3
-lz -llzma
2646.0
2
SE +/- 5.60, N = 3
-lz -llzma
2637.6
1
SE +/- 2.60, N = 3
-lz -llzma
2637.2
3
SE +/- 0.59, N = 3
-lz -llzma
2630.6
600
1200
1800
2400
3000
1. (CC) gcc options: -O3 -pthread

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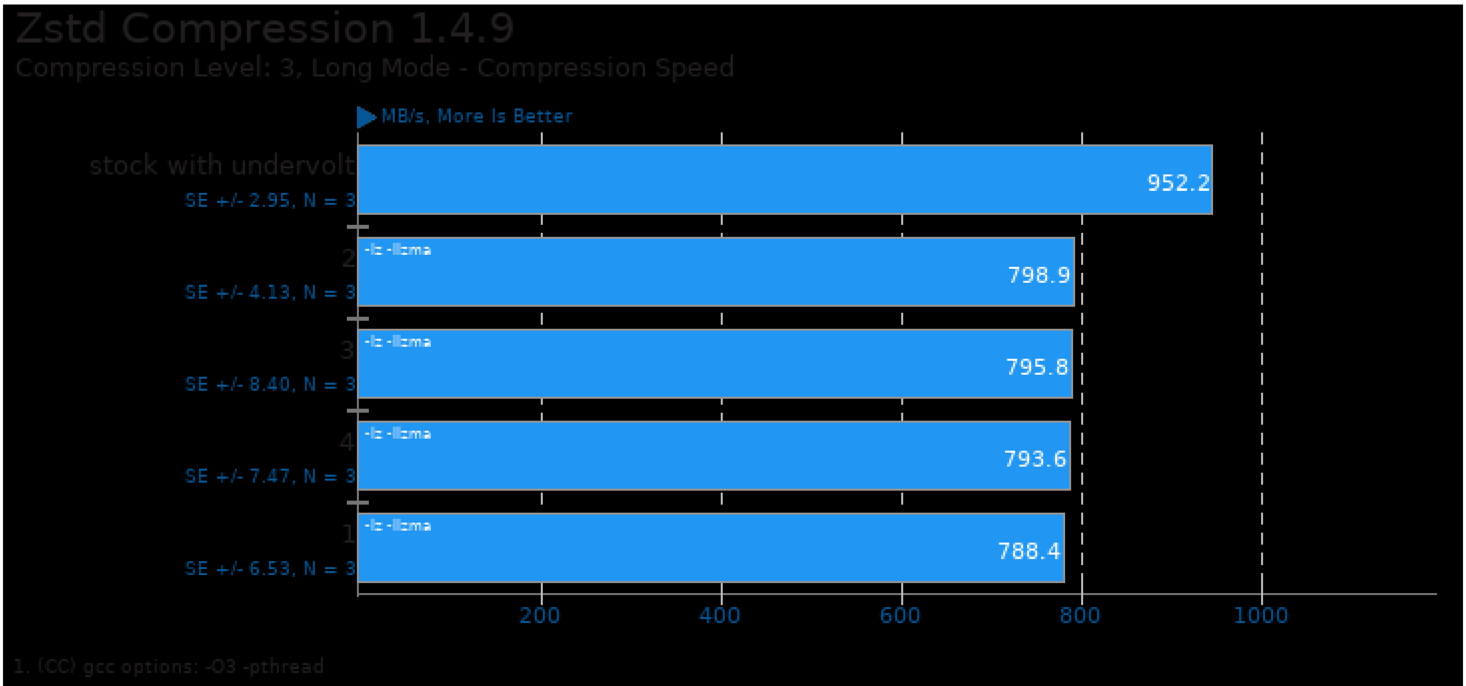
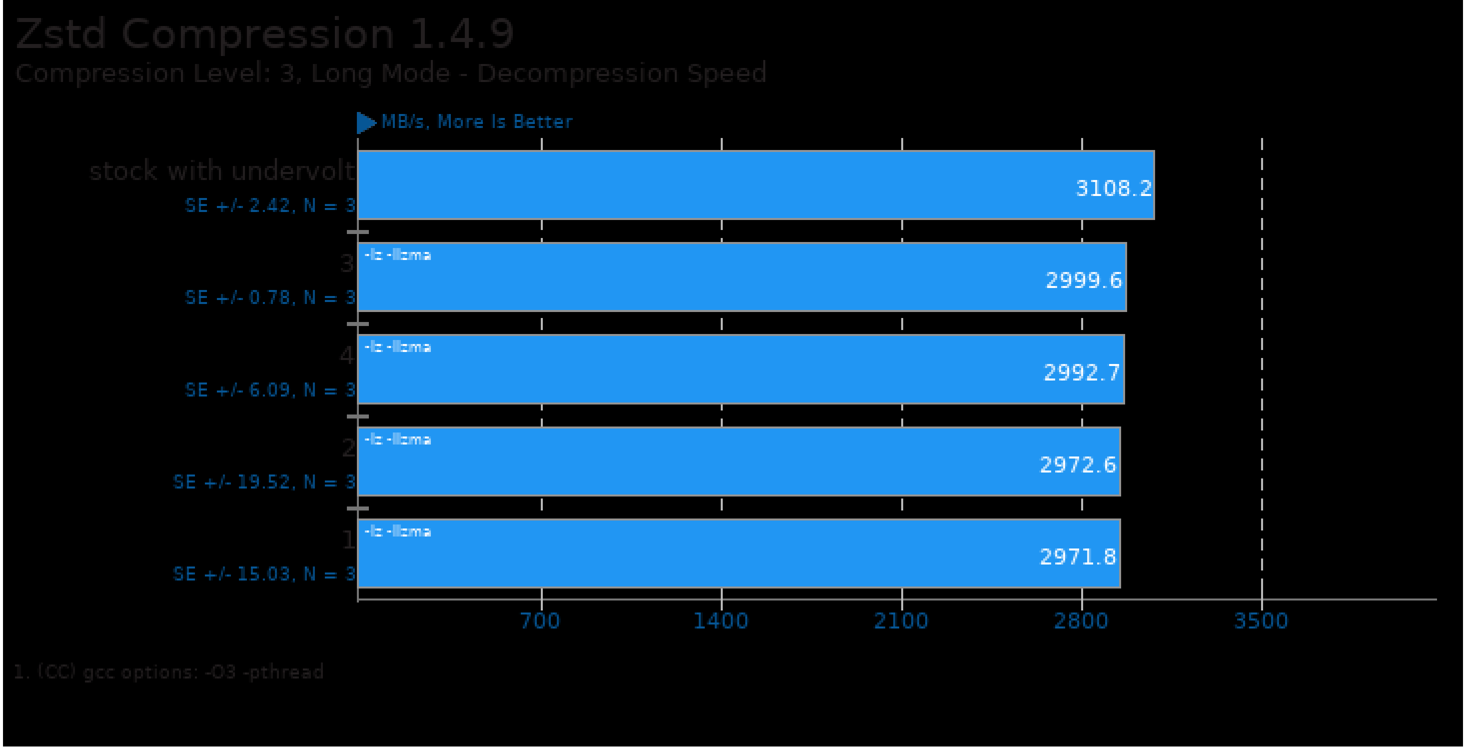
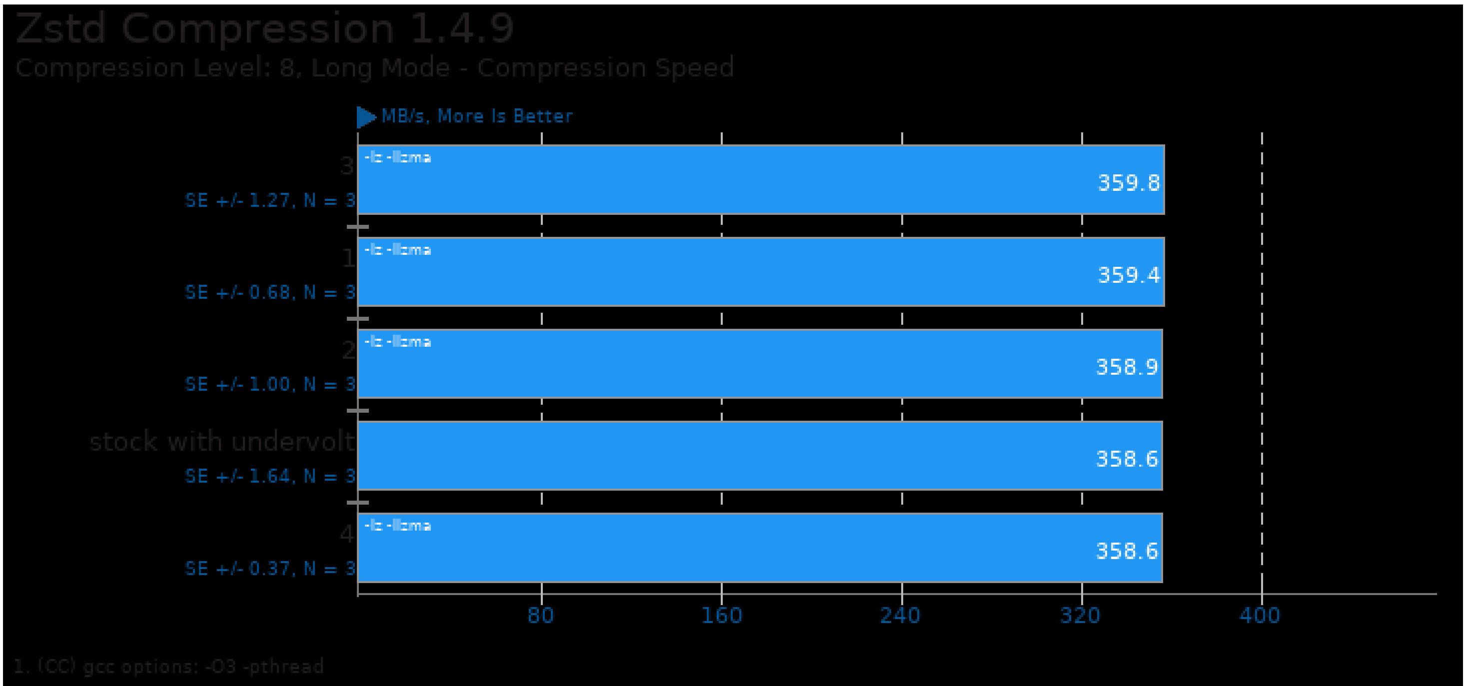
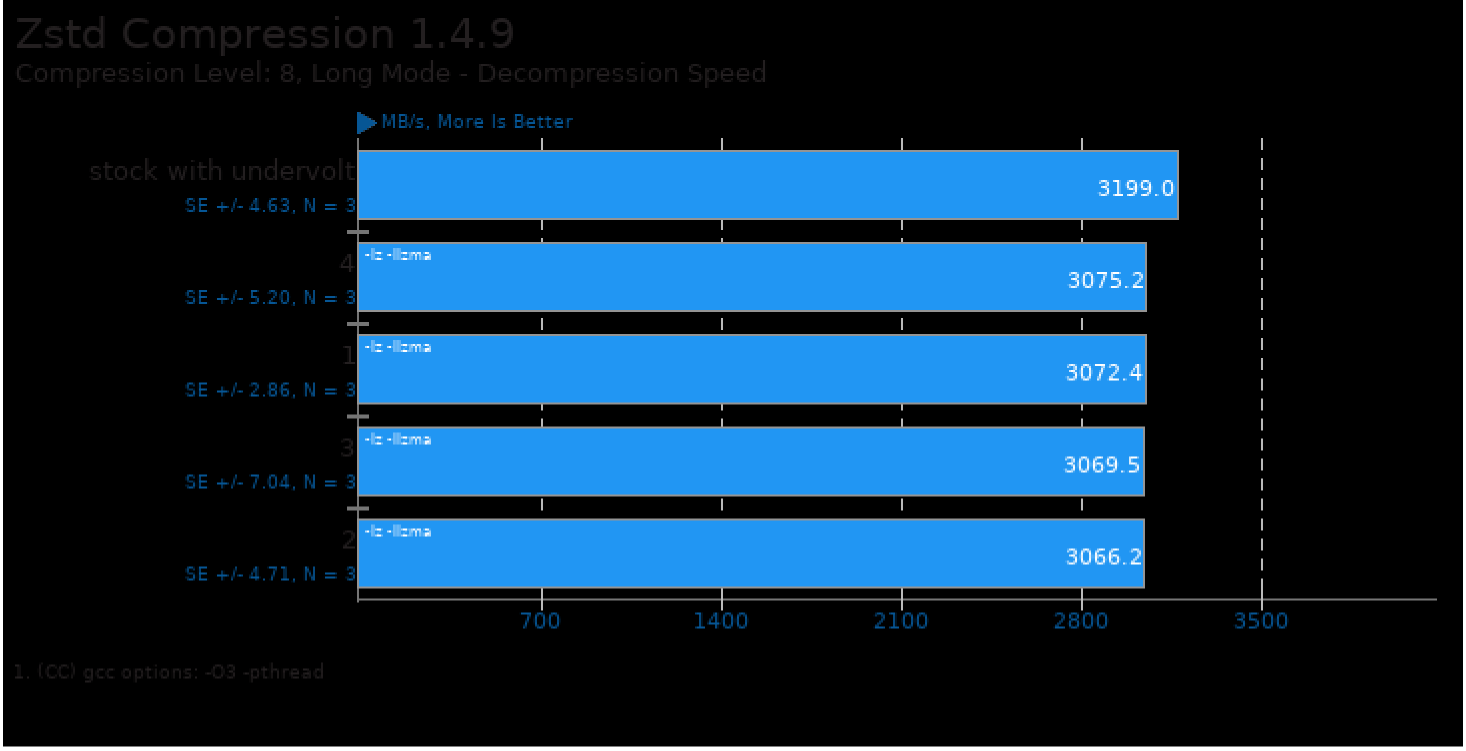
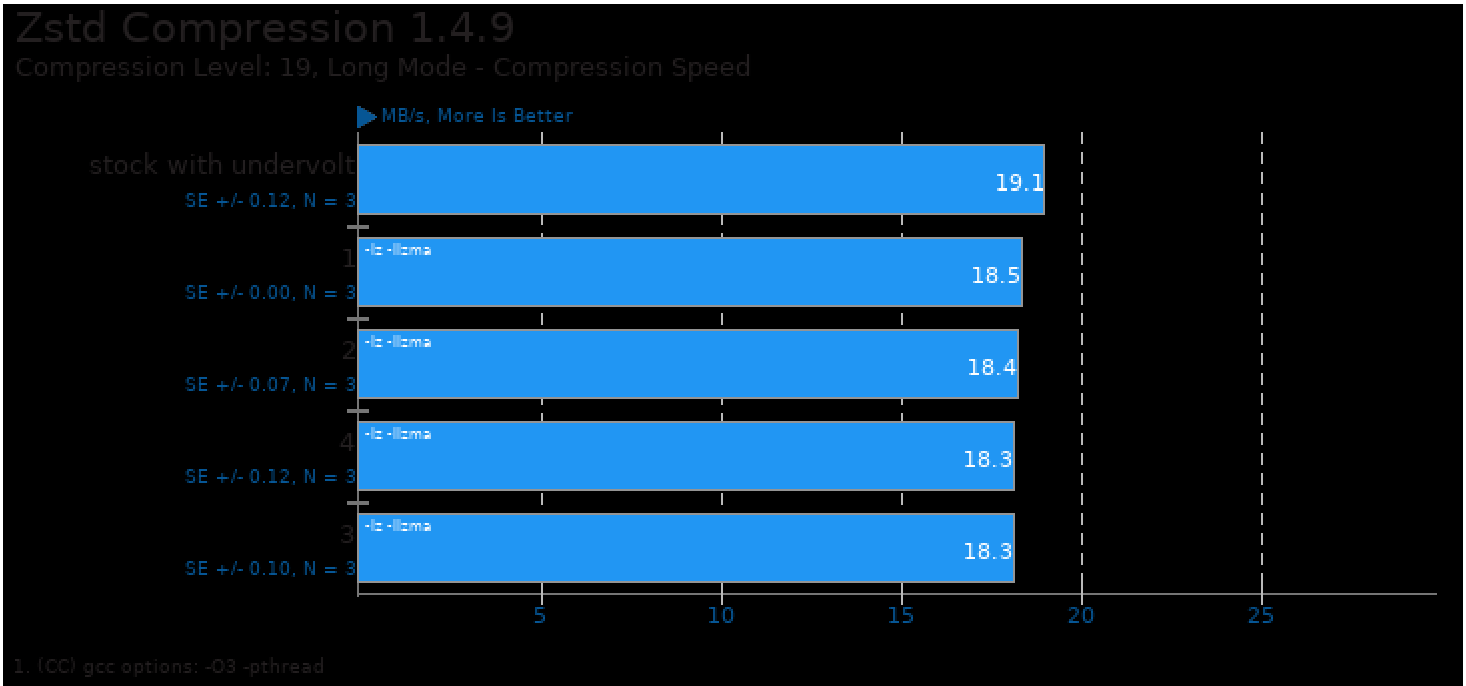
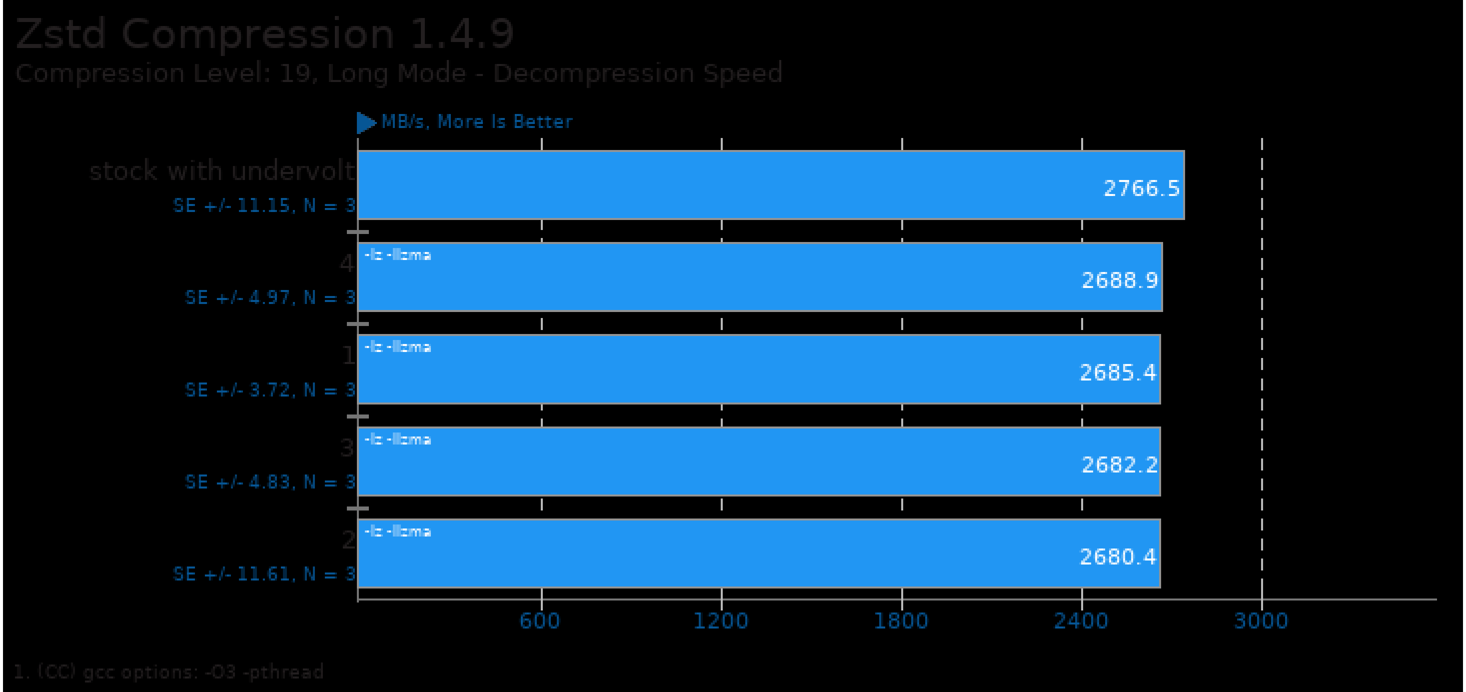





Zstd Compression 1.4.9
Compression Level: 8, Long Mode - Compression Speed
MB/s, More Is Better
3
SE +/- 1.27, N = 3
-lz -llzma
359.8
1
SE +/- 0.68, N = 3
-lz -llzma
359.4
2
SE +/- 1.00, N = 3
-lz -llzma
358.9
stock with undervolt
SE +/- 1.64, N = 3
358.6
4
SE +/- 0.37, N = 3
-lz -llzma
358.6
80
160
240
320
400
1. (CC) gcc options: -O3 -pthread


Zstd Compression 1.4.9
Compression Level: 8, Long Mode - Decompression Speed
MB/s, More Is Better
stock with undervolt
SE +/- 4.63, N = 3
3199.0
4
SE +/- 5.20, N = 3
-lz -llzma
3075.2
1
SE +/- 2.86, N = 3
-lz -llzma
3072.4
3
SE +/- 7.04, N = 3
-lz -llzma
3069.5
2
SE +/- 4.71, N = 3
-lz -llzma
3066.2
700
1400
2100
2800
3500
1. (CC) gcc options: -O3 -pthread





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