**SPEC CPU®2017 Integer Rate Result**

**Dell Inc.**

**PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)**

**SPECRate®2017_int_base = 120**

**SPECRate®2017_int_peak = 125**

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Test Sponsor</th>
<th>Tested by</th>
<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
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<td>55</td>
<td>Dell Inc.</td>
<td>Dell Inc.</td>
<td>Apr-2020</td>
<td>Feb-2020</td>
<td>Nov-2019</td>
</tr>
</tbody>
</table>

**CPU Name:** Intel Xeon Gold 6234

**Max MHz:** 4000

**Nominal:** 3300

**Enabled:** 16 cores, 2 chips, 2 threads/core

**Orderable:** 1.2 chips

**Cache L1:** 32 KB I + 32 KB D on chip per core

**L2:** 1 MB I+D on chip per core

**L3:** 24.75 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-3200V-R, running at 2400)

**Storage:** 1.8 TB SATA SSD

**Other:** None

**OS:** Red Hat Enterprise Linux 8.1

**kernel 4.18.0-147.el8.x86_64**

**Compiler:** C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;

**Fortran:** Version 19.0.5.281 of Intel Fortran Compiler for Linux

**Parallel:** No

**Firmware:** Version 2.6.3 released Jan-2020

**File System:** xfs

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** 32/64-bit

**Other:** None

**jemalloc memory allocator V5.0.1**

**Power Management:** BIOS set to prefer performance at the cost of additional power usage.

---

**500.perlbench_r**

Copies: 32

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<tr>
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**502.gcc_r**

Copies: 32

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**505.mcf_r**

Copies: 32

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**525.x264_r**

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**531.deepsjeng_r**

Copies: 32

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**541.leela_r**

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**548.exchange2_r**

Copies: 32

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**557.xz_r**

Copies: 32

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**Dell Inc.**

PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)

**SPECrate®2017_int_base = 120**

**SPECrate®2017_int_peak = 125**

**Results Table**

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</tr>
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</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

**Operating System Notes**

Stack size set to unlimited using "ulimit -s unlimited"

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
### General Notes (Continued)

is mitigated in the system as tested and documented.  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:  
    sync; echo 3>/proc/sys/vm/drop_caches  
    runcpu command invoked through numactl i.e.:  
    numactl --interleave=all runcpu <etc>  
    jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

### Platform Notes

BIOS settings:  
Virtualization Technology disabled  
System Profile set to Custom  
CPU Performance set to Maximum Performance  
C States set to Autonomous  
C1E disabled  
Uncore Frequency set to Dynamic  
Energy Efficiency Policy set to Performance  
Memory Patrol Scrub set to standard  
Logical Processor enabled  
CPU Interconnect Bus Link Power Management disabled  
PCI ASPM L1 Link Power Management disabled  
UPI Prefetch enabled  
LLC Prefetch disabled  
Dead Line LLC Alloc enabled  
Directory AtoS disabled  

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed4be6e46a485a0011  
running on localhost.localdomain Thu Apr 30 07:29:22 2020  

SUT (System Under Test) info as seen by some common utilities.  
For more information on this section, see  
https://www.spec.org/cpu2017/Docs/config.html#sysinfo  

From /proc/cpuinfo  
    model name : Intel(R) Xeon(R) Gold 6234 CPU @ 3.30GHz  
    2 "physical id"s (chips)  
    32 "processors"  
cores, siblings (Caution: counting these is hw and system dependent. The following  
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)  
cpu cores : 8  
siblings : 16  

(Continued on next page)
Dell Inc.

PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)

SPECrate®2017_int_base = 120
SPECrate®2017_int_peak = 125

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tester by: Dell Inc.

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

From lscpu:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 2
- Core(s) per socket: 8
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6234 CPU @ 3.30GHz
- Stepping: 7
- CPU MHz: 3871.040
- CPU max MHz: 4000.0000
- CPU min MHz: 1200.0000
- BogoMIPS: 6600.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0,8,12,14,16,24,28,30
- NUMA node1 CPU(s): 1,5,9,13,17,21,25,29
- NUMA node2 CPU(s): 2,4,6,10,18,20,22,26
- NUMA node3 CPU(s): 3,7,11,15,19,23,27,31
- Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pppin ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512if v洪x512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occujall cqm_mbb_total cqm_mbb_local dtherm ida arat pnu pts pkup ospe axv512_vnni md_clear flush_lld arch_capabilities

/cache data
- cache size: 25344 KB
Dell Inc.  
PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)  

**SPEC CPU®2017 Integer Rate Result**

Copyright 2017-2020 Standard Performance Evaluation Corporation

---

**Dell Inc.**

**PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)**

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Nov-2019

---

**SPECrate®2017_int_base = 120**  
**SPECrate®2017_int_peak = 125**

---

**Platform Notes (Continued)**

From `numactl --hardware`  
**WARNING:** a numactl 'node' might or might not correspond to a physical chip.  
- available: 4 nodes (0-3)  
  - node 0 cpus: 0 8 12 14 16 24 28 30  
  - node 0 size: 95308 MB  
  - node 0 free: 94642 MB  
  - node 1 cpus: 1 5 9 13 17 21 25 29  
  - node 1 size: 96740 MB  
  - node 1 free: 96168 MB  
  - node 2 cpus: 2 4 6 10 18 20 22 26  
  - node 2 size: 96766 MB  
  - node 2 free: 96437 MB  
  - node 3 cpus: 3 7 11 15 19 23 27 31  
  - node 3 size: 96755 MB  
  - node 3 free: 96442 MB  

node distances:

- node 0: 10 21 11 21  
- node 1: 21 10 21 11  
- node 2: 11 21 10 21  
- node 3: 21 11 21 10

From `/proc/meminfo`  
MemTotal: 394834652 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`  
**NAME**="Red Hat Enterprise Linux"  
**VERSION**="8.1 (Ootpa)"  
**ID**="rhel"  
**ID_LIKE**="fedora"  
**VERSION_ID**="8.1"  
**PLATFORM_ID**="platform:el8"  
**PRETTY_NAME**="Red Hat Enterprise Linux 8.1 (Ootpa)"  
**ANSI_COLOR**="0;31"  
**redhat-release**: Red Hat Enterprise Linux release 8.1 (Ootpa)  
**system-release**: Red Hat Enterprise Linux release 8.1 (Ootpa)

From `/etc/*release* /etc/*version*`  
**os-release**:
  - NAME="Red Hat Enterprise Linux"  
  - VERSION="8.1 (Ootpa)"  
  - ID="rhel"  
  - ID_LIKE="fedora"  
  - VERSION_ID="8.1"  
  - PLATFORM_ID="platform:el8"  
  - PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"  
  - ANSI_COLOR="0;31"  
  - redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)  
  - system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)

**uname -a:**

Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019  
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

(Continued on next page)
Dell Inc.
PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 120
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Platform Notes (Continued)

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usrspace/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Apr 30 07:28 last=5
SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.7T 20G 1.7T 2% /home

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.6.3 01/18/2020
Vendor: Dell Inc.
Product: PowerEdge R440
Product Family: PowerEdge
Serial: F9TD613

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
Memory:
12x 002C069D002C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
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<th>C</th>
<th>502.gcc_r(peak)</th>
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<tbody>
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Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
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(Continued on next page)
Compiler Version Notes (Continued)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5
NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
------------------------------------------------------------------------------

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------

Intel(R) C Compiler for applications running on IA-32, Version 19.0.5 NextGen
Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
                  | 525.x264_r(base, peak) 557.xz_r(base)
------------------------------------------------------------------------------

Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
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C       | 502.gcc_r(peak)
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(Continued on next page)
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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**Compiler Version Notes (Continued)**

```plaintext
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
        | 525.x264_r(base, peak) 557.xz_r(base)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5
NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---
```

```plaintext
C       | 500.perlbench_r(peak) 557.xz_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---
```

```plaintext
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
        | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.0.5
NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---
```

```plaintext
Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---
```

---

**Base Compiler Invocation**

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort
### SPEC CPU®2017 Integer Rate Result

**Dell Inc.**  
PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)  

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#### Test Details
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- **Test Sponsor:** Dell Inc.  
- **Tested by:** Dell Inc.  
- **Test Date:** Apr-2020  
- **Hardware Availability:** Feb-2020  
- **Software Availability:** Nov-2019

### Base Portability Flags

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
- 502.gcc_r: -DSPEC_LP64  
- 505.mcf_r: -DSPEC_LP64  
- 520.omnetpp_r: -DSPEC_LP64  
- 523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX  
- 525.x264_r: -DSPEC_LP64  
- 531.deepsjeng_r: -DSPEC_LP64  
- 541.leela_r: -DSPEC_LP64  
- 548.exchange2_r: -DSPEC_LP64  
- 557.xz_r: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto  
- -mfpmath=sse -funroll-loops -qnextgen -fuse-ld=gold  
- -qopt-mem-layout-trans=4  
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
- -lqkmalloc

**C++ benchmarks:**
- -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto -mfpmath=sse  
- -funroll-loops -qnextgen -fuse-ld=gold -qopt-mem-layout-trans=4  
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
- -lqkmalloc

**Fortran benchmarks:**
- -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div  
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs  
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin  
- -lqkmalloc

### Peak Compiler Invocation

**C benchmarks:**
- icc

**C++ benchmarks:**
- icpc

**Fortran benchmarks:**
- ifort
Dell Inc.

PowerEdge R440 (Intel Xeon Gold 6234, 3.30 GHz)

SPECRate®2017_int_base = 120
SPECRate®2017_int_peak = 125

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnxtgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-32/lib
-ljemalloc

505.mcf_r: -basepeak = yes

525.x264_r: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -flto -O3
-ffast-math -qnxtgen -fuse-ld=gold
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:

(Continued on next page)
Peak Optimization Flags (Continued)

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: -m64 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen -fuse-ld=gold
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links: