



# **AOCC Quick Reference Guide**

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# Chapter 1: AMD EPYC 9xx5-Series Processors Compiler Options Quick Reference

## 1.1 AOCC compiler (C/C++/Fortran)

Latest release: 5.1, January 2026

<https://www.amd.com/en/developer/aocc.html>

Action	Command
<b>Architecture</b>	
Generate instructions that run on AMD 5 <sup>th</sup> Gen EPYC™ and AMD 5 <sup>th</sup> Gen Ryzen™	<code>-march=znver5</code>
Generate instructions supported in the given machine	<code>-march=native</code>
<b>Optimization Levels</b>	
Disable all optimizations	<code>-O0</code>
Enable minimal level optimizations	<code>-O1</code>
Enable moderate level optimizations (Default from AOCC 4.1)	<code>-O2/-O</code>
Enable all optimizations that attempt to make programs run faster	<code>-O3</code>
Enable O3 with other aggressive optimizations that may violate strict compliance and precisions	<code>-Ofast</code>
Enable link time optimization	<code>-flto</code>
Enable advanced optimizations - improved variants of various scalar, vector, and loop transformations	<code>-zopt</code>
Enable advanced vector transformations	<code>-fvector-transform -mllvm -enable-strided-vectorization</code>
Enable loop transformations	<code>-floopt-transform</code>
Enable advanced loop transformations	<code>-faggressive-loop-transform</code>
Enable memory layout optimizations	<code>-flto -fremap-arrays -mllvm -reduce-array-computations=3</code>
Enable function level optimizations	<code>-flto -fitodcalls -mllvm -function-specialize -flto -finline-recursion={1..4}</code>

Action	Command
Profile guided optimizations	-fprofile-instr-generate (1st invocation) -fprofile-instr-use (2nd invocation)
Enable use of OpenMP® directives	-fopenmp
Enable streaming stores to optimize memory bandwidth usage	-fnt-store
<b>Other Options</b>	
Enable faster, less precise math operations (part of Ofast)	-ffast-math -freciprocal-math
OpenMP® threads and affinity (N number of cores)	export OMP_NUM_THREADS=N export GOMP_CPU_AFFINITY="0-{N-1}"
Link to AMD library	-L/libm-install-dir/lib -lamdlibm -lm
Enable vector library	-fveclib=AMDLIBM -lamdlibm -lm
Enable faster library	-Ofast -ffastlib=AMDLIBM -lamdlibmfast -lamdlibm -lm
<b>For Fortran Workloads</b>	
Compile Fortran free form layout	-ffree-form

## 1.2 AMD Optimized Libraries

Latest release: 5.2, December 2025

<https://www.amd.com/en/developer/aocl.html>

## 1.3 AMD uProf (Performance & Power Profiler)

Latest release: 5.2, December 2025

<https://www.amd.com/en/developer/uprof.html>

## 1.4 GNU Compiler Collection

Recommended version: GCC 14.1 or later

Latest release: GCC 15.2, August 2025

<http://gcc.gnu.org>

## 1.5 glibc

Latest release: 2.42, July 2025

Recommendation: 2.38 or later

<https://www.gnu.org/software/libc/>

## 1.6 Binutils

Latest release: 2.45.1, November 2025

Recommendation: 2.42 or later

<https://www.gnu.org/software/binutils/>

Action	Command
<b>Architecture</b>	
Generate instructions that run on AMD 5 <sup>th</sup> Gen EPYC™ and AMD 5 <sup>th</sup> Gen Ryzen™	-march=znver5
Generate instructions supported in the given machine	-march=native
<b>Optimization Levels</b>	
Disable all optimizations (default)	-O0
Enable minimal level optimizations	-O1/ -O
Enable moderate level optimizations	-O2
Enable all optimizations that attempt to make programs run faster	-O3
Enable O3 with other aggressive optimizations that may violate strict compliance and precisions	-Ofast
<b>Additional Optimizations</b>	
Enable link time optimizations	-flto
Enable unrolling	-funroll-all-loops
Generate memory preload instructions	-fprefetch-loop-arrays
Enable profile-guided optimizations	-fprofile-generate (1 <sup>st</sup> invocation)
	-fprofile-use (2 <sup>nd</sup> invocation)
Enable use of OpenMP® directives	-fopenmp

Action	Command
<b>Other Options</b>	
Enable compiler to use IEEE FP comparisons	<code>-mieee-fp</code>
Enable faster, less precise math operations	<code>-ffast-math</code>
Compile Fortran free form layout	<code>-ffree-form</code>
OpenMP® threads and affinity (N number of cores)	<code>export OMP_NUM_THREADS=N</code> <code>export GOMP_CPU_AFFINITY="0-{N-1}"</code>
Link to AMD library	<code>-L/libm-install-dir/lib -lamdlibm -lm</code>

## 1.7 Microsoft® Visual Studio 2022

<https://visualstudio.microsoft.com/downloads/>

Action	Command
<b>Architecture</b>	
Generate instructions that run on AMD 5 <sup>th</sup> Gen EPYC™ and AMD 5 <sup>th</sup> Gen Ryzen™	<code>/arch:[AVX AVX2 AVX512]</code>
Optimize for 64-bit AMD processors	<code>/favor:AMD64</code>
<b>Optimization Levels</b>	
Disable optimizations	<code>/Od</code>
Maximum optimizations (favor space)	<code>/O1</code> <code>includes</code> <code>/Ob2</code>
Maximum optimizations (favor speed)	<code>/O2</code> <code>includes</code> <code>/Ob2</code>
Enable inline expansion	<code>/Ob</code> <code>(0/1/2/3)</code>
[link.exe] Eliminate unreferenced function and/or data	<code>/OPT:REF</code>
[link.exe] Perform identical COMDAT folding	<code>/OPT:ICF</code>
Output an informational message for loops that are auto-vectorized	<code>/Qvec-report:[1 2]</code>
Enable automatic parallelization of loops, used with <code>#pragma loop()</code> directive	<code>/Qpar</code>

Action	Command
Output an informational message for loops that are auto-parallelized	/Qpar-report:[1 2]
<b>Additional Optimizations</b>	
Maintain the precision for floating-point operations through proper rounding	/fp:precise
Optimize floating-point code for speed at the expense of floating point accuracy and correctness	/fp:fast
Whole Program Optimization (link-time code generation)	/GL
Enable Profile-guided optimizations	/LTCG /GENPROFILE (1 <sup>st</sup> invocation) /LTCG /USERPROFILE (2 <sup>nd</sup> invocation)
Enable OpenMP® Support	/openmp:experimental /openmp:llvm

## 1.8 Intel® oneAPI DPC++/C++ Compiler

Latest release: 2025.3

<http://software.intel.com>

Action	Command
<b>Architecture</b>	
Generate instructions that run on AMD 5 <sup>th</sup> Gen EPYC™ and AMD 5 <sup>th</sup> Gen Ryzen™	-axCORE-AVX512
<b>Optimization Levels</b>	
Disable all optimizations	-O0
Speed optimization without code growth	-O1
Enable optimization for speed including vectorization	-O2
Enable O2 and aggressive loop transformations	-O3
Enable set of aggressive options to improve speed	-Ofast
<b>Additional Optimizations</b>	
Set function inline level	-inline-level=<value>
Set maximum number of times to unroll loops	-unroll[=n]

Action	Command
Disable improved precision floating divides	<code>-no-prec-div</code>
Enable vectorization	<code>-vec</code>
Enable inter procedural optimizations (alias for -flto)	<code>-ipo</code>
Enable whole program link time optimization (LTO)	<code>-flto[=arg];</code> arg: full (default), thin
Enable use of OpenMP® directives	<code>-qopenmp</code>
Enable profile generated optimization	<code>-prof-gen</code> and <code>-prof-use</code>
<b>Other Options</b>	
Enable floating point accuracy tunings	<code>-fp-model</code>
Compile Fortran free form layout	<code>-free</code>



# Appendix A: Additional Resources and Legal Notices

## A.1 Revision History

Date	Revision	Description
January 2026	5.1	Updated the document with 5.1 release-specific updates.
October 2024	5.0	Created this document for the 5.0 release.

## A.2 Notices

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