

Metal Feature Set Tables

 Developer

Feature Availability

This table lists the availability of major Metal features.

OS	iOS 8	iOS 8	iOS 9	iOS 9	iOS 9	iOS 10	iOS 10	iOS 10	iOS 11	iOS 11	iOS 11	iOS 11	iOS 12	iOS 12	iOS 12	iOS 12	iOS 12	tvOS 9	tvOS 10	tvOS 11	tvOS 11	tvOS 12	tvOS 12	macOS 10.11	macOS 10.12	macOS 10.13	macOS 10.14	macOS 10.14	
GPU Family	1	2	1	2	3	1	2	3	1	2	3	4	1	2	3	4	5	1	1	1	2	1	2	1	1	1	1	2	
Version	1	1	2	2	1	3	3	2	4	4	3	1	5	5	4	2	1	1	2	3	1	4	2	1	2	3	4	1	
Feature Set	iOS_GPUFamily1_v1	iOS_GPUFamily2_v1	iOS_GPUFamily1_v2	iOS_GPUFamily2_v2	iOS_GPUFamily3_v1	iOS_GPUFamily1_v3	iOS_GPUFamily2_v3	iOS_GPUFamily3_v2	iOS_GPUFamily1_v4	iOS_GPUFamily2_v4	iOS_GPUFamily3_v3	iOS_GPUFamily4_v1	iOS_GPUFamily1_v5	iOS_GPUFamily2_v5	iOS_GPUFamily3_v4	iOS_GPUFamily4_v2	iOS_GPUFamily5_v1	tvOS_GPUFamily1_v1	tvOS_GPUFamily1_v2	tvOS_GPUFamily1_v3	tvOS_GPUFamily2_v1	tvOS_GPUFamily1_v4	tvOS_GPUFamily2_v2	macOS_GPUFamily1_v1	macOS_GPUFamily1_v2	macOS_GPUFamily1_v3	macOS_GPUFamily1_v4	macOS_GPUFamily2_v1	
Features																													
MetalKit	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Metal Performance Shaders		✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Programmable blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PVRTC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
EAC/ETC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ASTC pixel formats		✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Linear textures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
BC pixel formats																								✓	✓	✓	✓	✓	
MSSA depth resolve					✓			✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Counting occlusion query					✓			✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Base vertex/instance drawing					✓			✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Texture barriers																									✓	✓	✓	✓	
Memory barriers																												✓	
Layered rendering																	✓							✓	✓	✓	✓	✓	
Tessellation								✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Resource heaps						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Memoryless render targets						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Function specialization						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Function buffer read-writes											✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Function texture read-writes											✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Array of textures								✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Array of samplers											✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Cube map texture arrays											✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	
Stencil texture views						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Depth-16 pixel format																									✓	✓	✓	✓	
Extended range pixel formats								✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Wide color pixel format									✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Combined MSAA store and resolve action											✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Deferred store action						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
MSAA blits						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
sRGB writes					✓						✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
16-bit unsigned integer coordinates						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Extract, insert, and reverse bits						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
SIMD barrier						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Sampler max anisotropy						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Sampler LOD clamp						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Border color																										✓	✓	✓	
Dual-source blending									✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	
Indirect draw & dispatch arguments					✓			✓			✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Argument buffers ¹									✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	
Indirect command buffers													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Programmable sample positions									✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Uniform type									✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Imageblocks													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Tile shaders													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Imageblock sample coverage control													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Post-depth coverage													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Quad-scoped permute operations													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Raster order groups													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Non-uniform threadgroup size													✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	
Multiple viewports																										✓	✓	✓	
Device notifications																										✓	✓	✓	
Stencil feedback																	✓											✓	
Stencil resolve																	✓											✓	

¹ See [About Argument Buffers](#) for more information about argument buffer tiers, limits, and capabilities.
¹¹ Not all macOS Family 1v3 devices support raster order groups. You query `MTLDevice.rasterOrderGroupsSupported` at runtime to check.



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1 Infinite Loop
Cupertino, CA 95014
408-996-1010

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