

# Metal Feature Set Tables

**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 10	iOS 11	iOS 11	iOS 11	tvOS 9	tvOS 10	tvOS 11	macOS 10.11	macOS 10.12	macOS 10.13	
GPU Family	1	2	1	2	3	1	2	3	1	2	3	1	1	1	1	1	1	1	
Version	1	1	2	2	1	3	3	2	4	4	3	1	2	3	1	2	3	3	
Feature Set	iOS_ GPUFamily1_ v1	iOS_ GPUFamily2_ v1	iOS_ GPUFamily1_ v2	iOS_ GPUFamily1_ v1	iOS_ GPUFamily3_ v1	iOS_ GPUFamily1_ v3	iOS_ GPUFamily2_ v3	iOS_ GPUFamily3_ v2	iOS_ GPUFamily1_ v4	iOS_ GPUFamily2_ v4	iOS_ GPUFamily3_ v3	tvOS_ GPUFamily1_ v1	tvOS_ GPUFamily1_ v2	tvOS_ GPUFamily1_ v3	macOS_ GPUFamily1_ v1	macOS_ GPUFamily1_ v2	macOS_ GPUFamily1_ v3		
Features																			
MetalKit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Metal Performance Shaders	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓
Programmable blending	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
PVRTC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
EAC/ETC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ASTC pixel formats	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
Linear textures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓
BC pixel formats																✓	✓		✓
MSAA depth resolve						✓			✓			✓							
Counting occlusion query						✓			✓			✓				✓	✓		✓
Base vertex/instance drawing						✓			✓			✓				✓	✓		✓
Indirect buffers						✓			✓			✓				✓	✓		✓
Cube map texture arrays																✓	✓		✓
Texture 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												✓							✓
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 argument buffers										✓	✓	✓	✓	✓	✓				✓
Programmable sample positions										✓	✓	✓	✓	✓	✓				✓
Uniform type										✓	✓	✓	✓	✓	✓				✓
Raster order groups																			✓
Non-uniform threadgroup size																			✓
Multiple viewports																			✓
Device notifications																			✓

**Implementation Limits**

This table lists the implementation limits in Metal.

OS	iOS 8	iOS 8	iOS 9	iOS 9	iOS 9	iOS 10	iOS 10	iOS 10	iOS 10	iOS 11	iOS 11	iOS 11	tvOS 9	tvOS 10	tvOS 11	macOS 10.11	macOS 10.12	macOS 10.13	
GPU Family	1	2	1	2	3	1	2	3	1	2	3	1	1	1	1	1	1	1	
Version	1	1	2	2	1	3	3	2	4	4	3	1	2	3	1	2	3	3	
Feature Set	iOS_GPUFamily1_v1	iOS_GPUFamily2_v1	iOS_GPUFamily1_v2	iOS_GPUFamily1_v1	iOS_GPUFamily3_v1	iOS_GPUFamily1_v3	iOS_GPUFamily2_v3	iOS_GPUFamily3_v2	iOS_GPUFamily1_v4	iOS_GPUFamily2_v4	iOS_GPUFamily3_v3	tvOS_GPUFamily1_v1	tvOS_GPUFamily1_v2	tvOS_GPUFamily1_v3	macOS_GPUFamily1_v1	macOS_GPUFamily1_v2	macOS_GPUFamily1_v3	macOS_GPUFamily1_v3	
Function arguments																			
Maximum number of vertex attributes, per vertex descriptor	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
Maximum number of entries in the buffer argument table, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
Maximum number of entries in the texture argument table, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	128	128	128	
Maximum number of entries in the sampler state argument table, per graphics or compute function	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
Maximum number of entries in the threadgroup memory argument table, per compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
Maximum number of inlined constant data buffers, per graphics or compute function	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	14	14	14	
Maximum length of an inlined constant data buffer, per graphics or compute function	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	4 KB	
Maximum threads per threadgroup	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	1024	1024	1024	
Maximum total threadgroup memory allocation*	16352 B	16352 B	16352 B	16352 B	16 KB	16352 B	16352 B	16 KB	16352 B	16352 B	16 KB	16352 B	16352 B	16352 B	16352 B	32 KB	32 KB	32 KB	
Threadgroup memory length alignment	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	16 B	
Maximum function memory allocation for a buffer in the constant address space	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit	64 KB	64 KB	64 KB	
Maximum number of inputs (scalars or vectors) to a fragment function, declared with the stage_in qualifier**	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	32	32	32	
Maximum number of input components to a fragment function, declared with the stage_in qualifier**	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	128	128	128	
Maximum number of function constants	Not available	Not available	Not available	Not available	Not available	65536	65536	65536	65536	65536	65536	65536	Not available	65536	65536	Not available	65536	65536	
Maximum tessellation factor	Not available	Not available	Not available	Not available	Not available	Not available	Not available	16	Not available	Not available	16	Not available	Not available	Not available	Not available	Not available	64	64	
Maximum number of viewports and scissor rectangles, per vertex function	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	
Resources																			
Maximum buffer length	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB	1 GB	1 GB	
Minimum buffer offset alignment	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	4 B	256 B	256 B	256 B	
Maximum 1D texture width	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	
Maximum 2D texture width and height	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	
Maximum cube map texture width and height	4096 px	4096 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	16384 px	8192 px	8192 px	8192 px	8192 px	16384 px	16384 px	16384 px	
Maximum 3D texture width, height, and depth	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	2048 px	
Maximum number of layers per 1D texture array, 2D texture array, or 3D texture	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	
Buffer alignment for copying an existing texture to a buffer	64 B	64 B	64 B	64 B	16 B	64 B	64 B	16 B	64 B	64 B	16 B	64 B	64 B	64 B	64 B	256 B	256 B	256 B	
Buffer alignment for creating a new texture from a buffer	64 B	64 B	64 B	64 B	16 B	64 B	64 B	16 B	64 B	64 B	16 B	64 B	64 B	64 B	64 B	Not available	Not available	Not available	
Render Targets																			
Maximum number of color render targets per render pass descriptor	4	8	4	8	8	4	8	8	4	8	8	8	8	8	8	8	8	8	
Maximum size of a point primitive	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	511	
Maximum total render target size, per pixel, when using multiple color render targets	128 bits	256 bits	128 bits	256 bits	256 bits	128 bits	256 bits	256 bits	128 bits	256 bits	256 bits	256 bits	256 bits	256 bits	256 bits	No limit	No limit	No limit	
Maximum visibility query offset	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	65528 B	

\*In some iOS and tvOS feature sets, the driver may consume up to 32 B of a device's total threadgroup memory. Therefore, the maximum limit is actually 16 KB minus 32 B, which equals 16352 B.  
 \*\*A vector counts as n scalars, where n is the number of components in the vector. In iOS and tvOS feature sets, you can only reach the maximum number of inputs if you do not exceed the maximum number of input components. For example, you can have 60 float inputs (60 input components) but you cannot have 60 float4 inputs (240 input components).

**Pixel Format Capabilities**

This table lists the capabilities of all Metal pixel formats. These capabilities determine the operations that can be performed on a texture that uses a given pixel format. All graphics and compute functions can read or sample from any texture, regardless of its pixel format. Additional capabilities are defined as follows:

- Filter—the texture can be filtered during sampling.
- Write—the texture can be written to by a function.\*
- Color—the texture can be used as a color render target.
- Blend—the texture can be blended.
- MSAA—the texture can be used as the destination for multisample antialias (MSAA) data.
- Resolve—the texture can be used as the destination for resolved MSAA data.
- All—the texture has all the previously-listed capabilities.

OS	iOS 8	iOS 8	iOS 9	iOS 9	iOS 9	iOS 10	iOS 10	iOS 10	iOS 11	iOS 11	iOS 11	tvOS 9	tvOS 10	tvOS 11	macOS 10.11	macOS 10.12	macOS 10.13	
GPU Family	1	2	1	2	3	1	2	3	1	2	3	1	1	1	1	1	1	
Version	1	1	2	2	1	3	3	2	4	4	3	1	2	3	1	2	3	
Feature Set	iOS_GPUFamily1_v1	iOS_GPUFamily2_v1	iOS_GPUFamily1_v2	iOS_GPUFamily1_v1	iOS_GPUFamily3_v1	iOS_GPUFamily1_v3	iOS_GPUFamily2_v1	iOS_GPUFamily3_v2	iOS_GPUFamily1_v4	iOS_GPUFamily2_v4	iOS_GPUFamily3_v3	tvOS_GPUFamily1_v1	tvOS_GPUFamily1_v2	tvOS_GPUFamily1_v3	macOS_GPUFamily1_v1	macOS_GPUFamily1_v2	macOS_GPUFamily1_v3	
<b>Ordinary 8-bit pixel formats</b>																		
A8Unorm	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
R8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All
R8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	Not available	Not available	Not available	
R8Snorm	Filter Write Color MSAA Blend	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	All	All	All	All	All	All	
R8Uint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
R8Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
<b>Ordinary 16-bit pixel formats</b>																		
R16Unorm	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend
R16Snorm	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend	Filter Write Color MSAA Blend
R16Uint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
R16Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
R16Float	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	
RG8Unorm	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	All	
RG8Unorm_sRGB	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	Filter Color MSAA Resolve Blend	All	All	Not available	Not available	Not available	
RG8Snorm	Filter Write Color MSAA Blend	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	Filter Write Color MSAA Blend	All	All	All	All	All	All	All	All	
RG8Uint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
RG8Sint	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	Write Color MSAA	
<b>Packed 16-bit pixel formats</b>																		
B5G6R5Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend
A1BGR5Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend
ABGR4Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend
BGR5A1Unorm	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend	Filter Color MSAA Resolve Blend
<b>Ordinary 32-bit pixel formats</b>																		
R32Uint	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	
R32Sint	Color	Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	Write Color	
R32Float	Color MSAA Blend	Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	Write Color MSAA Blend	



GBGR422 BGRG422	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
<b>Depth and stencil pixel formats</b>																		
Depth16Unorm	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Filter MSAA Resolve	Filter MSAA Resolve
Depth32Float	MSAA	MSAA	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA
Depth24Unorm_Stencil8	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
Depth32Float_Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA Resolve	MSAA	MSAA	MSAA	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve	Filter MSAA Resolve
X24_Stencil8	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	MSAA	MSAA	MSAA	MSAA
X32_Stencil8	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA	MSAA
<b>Extended range and wide color pixel formats</b>																		
BGRA10_XR BGRA10_XR_sRGB BGR10_XR BGR10_XR_sRGB	Not available	Not available	Not available	Not available	Not available	Not available	Not available	All	Not available	Not available	All	Not available	Not available	Not available	Not available	Not available	Not available	Not available
BGR10A2Unorm	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	Not available	All

\*Read-write textures are available in some macOS feature sets, where the texture can be both read from and written to by the same function.

\*\*For PVRTC pixel formats, the clamp\_to\_zero sampler state is supported only in the iOS GPU Family 3 feature sets.



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