

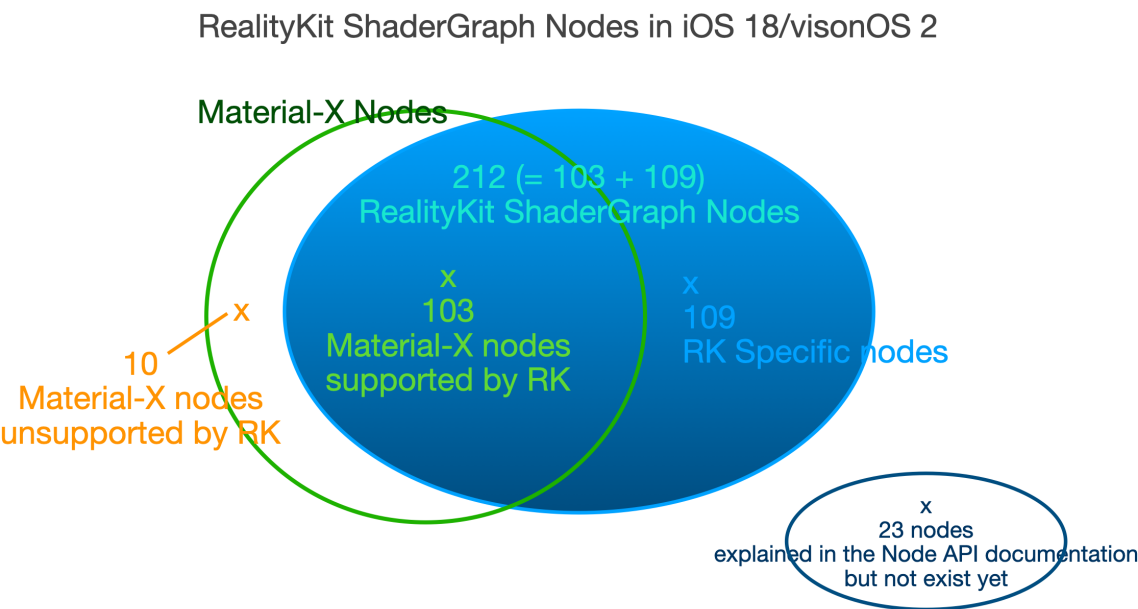
A List of the Shader Graph Nodes in visionOS 2

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This documentation shows a list of ShaderGraph nodes. ShaderGraph nodes are components for creating shaders provided by RealityKit, one of Apple's frameworks. Developers can create complex materials and visual effects using Reality Composer Pro's node-based material editor, or manipulate them programmatically through the API.

Material-X compliant nodes and RealityKit specific nodes

RealityKit Shader Graph provides nodes compliant with Material-X and nodes unique to RealityKit. As shown in the figure below, about half of the nodes are Material-X compliant nodes, and the remaining half are RealityKit-specific nodes. Among the nodes defined by Material-X, there are some that are not supported by RealityKit Shader Graph. Although they are defined in the Apple Documentation [AppleDoc] as RealityKit-specific nodes, there are some nodes that have not yet been implemented in Xcode 16.



List of RealityKit ShaderGraph Nodes

The ShaderGraph nodes provided by RealityKit in iOS18/visionOS 2 are shown in the table below. There are those that correspond to nodes defined in Material-X, and those that are unique to RealityKit. RealityKit ShaderGraph nodes that correspond to the Material-X definition have the Material-X Node Name written in the table. RealityKit-specific nodes are indicated with an 'x' mark. Apple Documentation describes ShaderGraph node, but those that are not yet implemented in Xcode 16.0 are marked with *A and have a gray background color.

The Categories in the table below are not used in Material-X, but are used in the Apple API Documentation regarding ShaderGraph Nodes. Although there are differences between the two, the one from the API Documentation is used here for convenience when referring to the API Documentation.

As of Nov, 2024, RealityKit Shader Graph is compliant with Material-X Specification v1.38 [AppleDoc]. The latest version of Material-X is v1.39, and it is expected that it will be supported in the future. Additionally, the implementation status shown in this document is for Xcode 16.0/visionOS 2.0. The latest version of visionOS is ver. 2.1. The latest information may differ from what is in this document, so please update it yourself.

ShaderGraph Nodes in RealityKit of iOS18/visionOS 2.0

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
2D-Procedural				
	Ramp Horizontal	ramplr		
	Ramp Vertical	ramptrb		
	Ramp 4 Corners	ramp4		
	Split Horizontal	splitlr		
	Split Vertical	splittrb		
	Noise 2D	noise2d		
	Cellular Noise 2D	cellnoise2d		
	Worley Noise 2D	warleynoise2d		
SD-Texture				
	Image	image		
	Tiled Image	tiledimage		
	UV Texture		x	
	Transform 2D		x	
3D-Procedural				
	Noise 3D	noise3d		
	Fractal Noise 3D	fractal3d		
	Cellular Noise 3D	cellnoise3d		
	Worley Noise 3D	warleynoise3d		
3D-Texture				
	Triplanar Projection	triplanarprojection		

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
Adjustment				
	Remap	remap		
	Smooth Step	smoothstep		
	Luminance	luminance		
	RGB to HSV	rgbtohsv		
	HSV to RGB	hsvtorgb		
	Contrast	contrast		
	Range	range		
	HSV Adjust	hsvadjust		
	Saturate	saturate		
	Step (RealityKit)		x	
Application				
	Time (float)	time		
	Up Direction	updirection		
Compositing				
	Premultiply	premult		
	Unpremultiply	unpremult		
	Additive Mix	plus		
	Subtractive Mix	minus		
	Difference	difference		
	Burn	burn		
	Dodge	dodge		
	Screen	screen		
	Overlay	overlay		
	Disjoint Over	disjointover		
	In	in		
	Mask	mask		
	Matte	matte		
	Out	out		
	Over	over		
	Inside	inside		
	Outside	outside		
	Mix	mix		

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
Data				
	Convert	convert		
	Swizzle	swizzle		
	Combine 2	combine2		
	Combine 3	combine3		
	Combine 4	combine4		
	Extract	extract		
	Separate 2	separateN		
	Separate 3	separateN		
	Separate 4	separateN		
	Primvar Reader		x	
Geometric				
	Position	position		
	Normal	normal		
	Tangent	tangent		
	Bitangent	bitangent		
	Texture Coordinates	texcoord		
	Geometry Color	geomcolor		
	Geometric Property	geompropvalue		
	Reflect (RealityKit)		x	
	Refract (RealityKit)		x	
Logic				
	If Greater	ifgreater		
	If Greater Or Equal	ifgreatereq		
	If Equal	ifequal		
	Switch	switch		
	And (RealityKit)		x	
	Or (RealityKit)		x	
	XOR (RealityKit)		x	
	Not (RealityKit)		x	
Material				
	NodeGraph		x	
Math				

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Add	add		
	Subtract	subtract		
	Multiply	multiply		
	Divide	divide		
	Modulo	modulo		
	Abs	absval		
	Floor	floor		
	Ceiling	ceil		
	Power	power		
	Sin	sin		
	Cos	cos		
	Tan	tan		
	Asin	asin		
	Acos	acos		
	Atan2	atan2		
	Square Root	sqrt		
	Natural Log	ln		
	Exp	exp		
	Sign	sign		
	Clamp	clamp		
	Min	min		
	Max	max		
	Normalize	normalize		
	Magnitude	magnitude		
	Dot Product	dotproduct		
	Cross Product	crossproduct		
	Transform Point	transformpoint		
	Transform Vector	transformvector		
	Transform Normal	transformnormal		
	Transform Matrix	transformmatrix		
	Transpose	transpose		
	Determinant	determinant		
	Invert Matrix	invertmatrix		

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Rotate 2D	rotate2d		
	Rotate 3D	rotate3d		
	Place 2D	place2d		
	Round	round		
	Safe Power	safepower		
	Normal Map	normalmap		
	Fractional (RealityKit)		x	
	One Minus (RealityKit)		x	
	Normal Map Decode		x	
Organization				
	Dot	dot		
Procedural				
	Float	constant		
	Color3 (Float)	constant		
	Color4 (Float)	constant		
	Vector3 (Float)	constant		
	Vector3 (Float)	constant		
	Vector4 (Float)	constant		
	Boolean	constant		
	Integer	constant		
	Matrix3x3 (Float)	constant		
	Matrix4x4 (Float)	constant		
	String	constant		
	Image File		x	
	Half	constant		
	Vector2 (Half)	constant		
	Vector3 (Half)	constant		
	Vector4 (Half)	constant		
	Matrix2x2 (Float)	constant		
	Integer2	constant		
	Integer3	constant		
	Integer4	constant		
RealityKit				

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Unlit Surface (RealityKit)		x	
	PBR Surface (RealityKit)		x	
	Occlusion Surface (RealityKit)		x	
	Shadow Receiving Occlusion Surface (RealityKit)		x	
	View Direction (RealityKit)		x	
	Camera Position (RealityKit)		x	
	Geometry Modifier Model to World (RealityKit)		x	
	Geometry Modifier World to Model (RealityKit)		x	
	Geometry Modifier Normal to World (RealityKit)		x	
	Geometry Modifier Model to View (RealityKit)		x	
	Geometry Modifier View To Projection (RealityKit)		x	
	Geometry Modifier Projection To View (RealityKit)		x	
	Geometry Modifier Vertex ID (RealityKit)		x	
	Surface Model To World (RealityKit)		x	
	Surface Model To View (RealityKit)		x	
	Surface World To View (RealityKit)		x	
	Surface View To Projection (RealityKit)		x	
	Surface Projection To View (RealityKit)		x	
	Surface Screen Position (RealityKit)		x	
	Surface View Direction (RealityKit)		x	
	Environment Radiance (RealityKit)		x	
	Hover State (RealityKit)		x	
	Blurred Background (RealityKit)		x	
	Geometry Modifier (RealityKit)		x	
	Camera Index Switch (RealityKit)		x	
	Image 2D (RealityKit)		x	
	Image 2D LOD (RealityKit)		x	
	Image 2D Gradient (RealityKit)		x	
	Image 2D Pixel (RealityKit)		x	
	Image 2D LOD Pixel (RealityKit)		x	
	Image 2D Gradient Pixel (RealityKit)		x	
	Cube Image (RealityKit)		x	
	Cube Image LOD (RealityKit)		x	

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Cube Image Gradient (RealityKit)		x	
	Image 2D Read (RealityKit)		x	
	Image 3D (RealityKit)		x	
	Image 3D LOD (RealityKit)		x	
	Image 3D Gradient (RealityKit)		x	
	Image 3D Pixel (RealityKit)		x	
	Image 3D LOD Pixel (RealityKit)		x	
	Image 3D Gradient Pixel (RealityKit)		x	
	Image 2D Array (RealityKit)		x	
	Image 2D Array LOD (RealityKit)		x	
	Image 2D Array Gradient (RealityKit)		x	
	Image 2D Array Pixel (RealityKit)		x	
	Image 2D Array LOD Pixel (RealityKit)		x	
	Image 2D Array Gradient Pixel (RealityKit)		x	
	Image 2D Array Read (RealityKit)		x	
	Image 3D Read (RealityKit)		x	
Surface				
	Preview Surface		x	A MaterialX version of USD Preview Surface.
Other				
	Add Saturate (RealityKit)		x	* A
	Count Leading Zeros (RealityKit)		x	* A
	Count Trailing Zeros (RealityKit)		x	* A
	Extract Bits (RealityKit)		x	* A
	Integer Average, Rounded Down (RealityKit)		x	* A
	Insert Bits (RealityKit)		x	* A
	Multiply Add Saturate (RealityKit)		x	* A
	Count Non Zeros (RealityKit)		x	* A
	Reverse Bits (RealityKit)		x	* A
	Integer Average, Rounded Up (RealityKit)		x	* A
	Rotate Bits (RealityKit)		x	* A
	Subtract Saturate (RealityKit)		x	* A
	Absolute Diff (RealityKit)		x	* A

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Multiply Add 24 (RealityKit)		x	
	Multiply 24 (RealityKit)		x	
	All (RealityKit)		x	* A
	Any (RealityKit)		x	* A
	Is Finite (RealityKit)		x	
	Is Infinite (RealityKit)		x	
	Is Not a Number (RealityKit)		x	
	Is Ordered (RealityKit)		x	
	Is Unordered (RealityKit)		x	
	Sign Bit (RealityKit)		x	
	Select (RealityKit)		x	
	Inverse Hyperbolic Cos (RealityKit)		x	
	Inverse Hyperbolic Sin (RealityKit)		x	
	Atan (RealityKit)		x	
	Inverse Hyperbolic Tan (RealityKit)		x	
	Copy Sign (RealityKit)		x	
	Hyperbolic Cos (RealityKit)		x	
	Cos Pi (RealityKit)		x	
	Exponential 2 (RealityKit)		x	
	Exponential 10 (RealityKit)		x	
	Fortran Difference and Minimum (RealityKit)		x	
	Fused Multiply-Add (RealityKit)		x	
	Max (RealityKit)		x	
	Min (RealityKit)		x	
	Modulo (RealityKit)		x	
	Fractional-(RealityKit)		x	* A
	Power Positive (RealityKit)		x	
	Round Integral (RealityKit)		x	
	Reciprocal Square Root (RealityKit)		x	
	Hyperbolic Sin (RealityKit)		x	
	Sin Pi (RealityKit)		x	
	Hyperbolic Tan (RealityKit)		x	
	Tan Pi (RealityKit)		x	

Shader Graph Categories in API Documentation	RealityKit Node Name	Material-X Node Name	RealityKit Specific	Note
	Truncate (RealityKit)		x	
	Distance (RealityKit)		x	
	Distance Square (RealityKit)		x	
	Magnitude Square (RealityKit)		x	
	Screen-Space X Partial Derivative (RealityKit)		x	
	Screen-Space Y Partial Derivative (RealityKit)		x	
	Absolute Derivatives Sum (RealityKit)		x	
	Log 2 (RealityKit)		x	
	Log 10 (RealityKit)		x	
	Reflection Diffuse (RealityKit)		x	
	Reflection Specular (RealityKit)		x	
subscripts	Absolute-(RealityKit)		x	* A
subscripts	Absolute-(RealityKit)		x	* A
subscripts	Max3-(RealityKit)		x	
subscripts	Max3-(RealityKit)		x	* A
subscripts	Median3-(RealityKit)		x	
subscripts	Median3-(RealityKit)		x	* A
subscripts	Min3-(RealityKit)		x	
subscripts	Min3-(RealityKit)		x	* A
subscripts	Multiply-High-(RealityKit)		x	* A
subscripts	Multiply-High-(RealityKit)		x	* A

*A : The node is explained in the Apple API Documentation. But the node doesn't exist in RealityKit with Xcode 16.0. So you cannot use it so far.

Unsupported Material-X Nodes

Among the Nodes defined in Material-X, the ones that RealityKit does not support are listed in the table below. Interoperability may need to be considered.

Unsupported Material-X (v1.38) Nodes in RealityKit in iOS 18/visionOS 2

Category	MaterialX Node Name	ShaderGraph Node Name	Description * Quoted from [AppleDoc]	Note
Global	ambientocclusion	n/a	Compute the ambient occlusion at the current surface point, returning a scalar value between 0 and 1. Ambient occlusion represents the accessibility of each surface point to ambient lighting, with larger values representing greater accessibility to light. This node must be of type float.	* Doesn't exist in Xcode 16.0.
Application	frame	n/a	the current frame number as defined by the host environment. This node must be of type float. Applications may use whatever method is appropriate to communicate the current frame number to the <frame> node's implementation, whether via an internal state variable, a custom input, or other method.	* Doesn't exist in Xcode 16.0.
Math	arrayappend	n/a	create a two-element array [in1, in2] from two base-type values, or append the in2 value to the end of the in1 array of the same type.	* Doesn't exist in Xcode 16.0.
Adjustment	curveadjust	n/a	output a smooth remapping of input values using the centripetal Catmull-Rom cubic spline curve defined by specified knot values, using an inverse spline lookup on input knot values and a forward spline through output knot values. All channels of the input will be remapped using the same curve.	* Doesn't exist in Xcode 16.0.
	curvelookup	n/a	output a float, colorN or vectorN value smoothly interpolated between a number of knotvalue values, using the position of in within knots as the knotvalues interpolant.	* Doesn't exist in Xcode 16.0.
Convolution	blur	n/a	a convolution blur.	* Doesn't exist in Xcode 16.0.
	heighttonormal	n/a	convert a scalar height map to a normal map of type vector3.	* Doesn't exist in Xcode 16.0.
Standard Shader-Semantic Operator	add	n/a	add two surface/displacement/volumeshader closures.	* Doesn't exist in Xcode 16.0.
	multiply	n/a	multiply a surface/displacement/volumeshader closure by a float or color3/vector3 value: surfaceshaders and volumeshaders may be multiplied by a float or color3, while displacementshaders may be multiplied by a float or vector3.	* Doesn't exist in Xcode 16.0.
	mix	n/a	linear blend between two surface/displacement/volumeshader closures.	* Doesn't exist in Xcode 16.0.

References

- [AppleDoc] Apple Documentation: Framework ShaderGraph, <https://developer.apple.com/documentation/shadergraph>
- [MatX] MaterialX Specification, <https://materialx.org/Specification.html>
- [ynaga23] MaterialX Nodes in RealityKit, <https://github.com/ynagatomo/evolution-Metal-ARKit-RealityKit-sheet#materialx-nodes-in-realitykit>