AMD Versal™ AI Edge Portfolio Product Selection Guide

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AMD Versal™ AI Edge Series – Resources

		VE2002	VE2102	VE2202	VE2302	VE1752	VE2602	VE2802
AI Engine	AI Engine-ML Tiles	8	12	24	34	0	152	304
	AI Engine Tiles	0	0	0	0	304	0	0
	AIE/AIE-ML Data Memory (Mb)	4	6	12	17	76	76	152
	AIE-ML Shared Memory (Mb)	32	48	48	68	0	304	304
Programmable Logic	System Logic Cells	43,750	80,080	229,688	328,720	981,120	820,313	1,139,040
	LUTs	20,000	36,608	105,000	150,272	448,512	375,000	520,704
	DSP Engines	90	176	324	464	1,312	984	1,312
	Distributed RAM (Mb)	0.6	1.1	3.2	4.6	13.7	11.4	15.9
Memory	Total Block RAM (Mb)	0.8	1.7	3.8	5.4	33.5	16.7	21.1
	UltraRAM (Mb)	6.8	13.2	30.4	43.6	129.9	63.0	74.3
	Accelerator RAM (Mb)	32	32	32	32	0	0	0
	Total PL Memory (Mb)	40.2	48	69.4	85.6	177.1	91.1	111.3
	DDR Memory Controllers (DDRMC)	1	1	1	1	3	3	3
	DDR Bus Width	64	64	64	64	192	192	192
Processing System	Application Processing Unit	Dual-core Arm® Cortex®-A72, 48 KB/32 KB L1 Cache w/ parity & ECC; 1 MB L2 Cache w/ ECC						
	Real-Time Processing Unit	Dual-core Arm Cortex-R5F, 32 KB/32 KB L1 Cache, and 256 KB TCM w/ECC						
	Memory	256 KB On-Chip Memory w/ECC						
	Connectivity	Ethernet (x2); UART (x2); CAN-FD (x2); USB 2.0 (x1); SPI (x2); I2C (x2)						
Serial Transceivers	GTY Transceivers	0	0	0	0	44	0	0
	GTYP Transceivers	0	0	8	8	0	32(1)	32(1)
Integrated Protocol IP	PCIe® w/DMA (CPM4)	–	–	–	–	1 x Gen4x16	–	–
	PCIe w/DMA (CPM5)	–	–	–	–	–	1 x Gen4x16	1 x Gen4x16
	PCIe (PL PCIE4)	–	–	1 x Gen4x8	1 x Gen4x8	4 x Gen4x8	–	–
	PCIe (PL PCIE5)	–	–	–	–	–	4 x Gen4x8	4 x Gen4x8
	40G Multirate Ethernet MAC	0	0	1	1	2	2	2
Platform	Video Decoder Engines (VDEs)	–	–	–	–	–	2	4
	Platform Mgmt Controller	Boot, Security, Safety, Monitoring, and High-Speed Debug						
Ordering Information	Extended Temp(2)	-1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE						
	Industrial Temp(2)	-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2LLI, -2HSI						

All parameters listed are maximum values. Verify all data in this document with the device data sheets or product guides.

Notes:
1. 16 GTYP transceivers are dedicated to CPM5 for PCI Express use.
2. In extended and industrial temperature grades, some ordering combinations can operate for a limited time with a junction temperature of 110°C. Timing parameters adhere to the same speed file at 110°C as they do below 110°C, regardless of operating voltage. Operation at 110°C Tj is limited to 3% of the device lifetime and can occur sequentially or at regular intervals as long as the total time does not exceed 3% of device lifetime.

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AMD Versal™ AI Edge Series – Packaging

			VE2002	VE2102	VE2202	VE2302	VE1752	VE2602	VE2802
Package Footprint	Package Dimensions (mm)	Ball Pitch (mm)	XPIO DDR Only, XPIO DDR+PL, XPIO PL Only HDIO, MIO GTY, GTYP						
SBVA484	19x19	0.8	108, 0, 54 0, 78 0, 0	108, 0, 54 0, 78 0, 0					
SBVA625	21x21	0.8	132, 30, 54 0, 78 0, 0	132, 30, 54 0, 78 0, 0					
SFVA784	23x23	0.8	132, 30, 54 0, 78 0, 0	132, 30, 54 0, 78 0, 0	132, 30, 54 22, 78 0, 8	132, 30, 54 22, 78 0, 8			
NSVG1369	35x35	0.92					132, 246, 0 44, 78 24, 0		
NSVH1369	35x35	0.92						132, 192, 0 44, 78 0, 32	132, 192, 0 44, 78 0, 32
VSVA1596	37.5x37.5	0.92					192, 186, 0 44, 78 32, 0		
VSVH1760	40x40	0.92						186, 300, 0 44, 78 0, 32	186, 300, 0 44, 78 0, 32
VSVA2197	45x45	0.92					192, 294, 0 44, 78 44, 0		

All parameters listed are maximum values. Verify all data in this document with the device data sheets or product guides.

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AMD Versal™ AI Edge Series – Figures of Merit

			VE2002	VE2102	VE2202	VE2302	VE1752	VE2602	VE2802
AI Engine	AI Engine Peak Perf – INT8	TOPS	5	8	16	23	101	101	202
	AI Engine Peak Perf – INT8x16	TOPS	3	4	8	11	51	51	101
	AI Engine Peak Perf – INT16	TOPS	1	2	4	6	25	25	51
	AI Engine Peak Perf – CINT16	Complex TOPS	0.3	0.5	1.0	1.4	6.3	6.3	12.6
	AI Engine Peak Perf – FP32	TFLOPs	0.4	0.7	1.3	1.9	6.3	8.3	16.6
	AI Engine Peak SRAM Bandwidth	Tb/s	11	16	32	45	405	202	405
Programmable Logic	DSP Engine Peak Perf – INT8	TOPS	0.6	1.2	2.2	3.2	9.1	6.8	9.1
	DSP Engine Peak Perf – INT24	TOPS	0.2	0.4	0.7	1.1	3.0	2.3	3.0
	DSP Engine Peak Perf – CINT18	Complex TOPS	0.1	0.2	0.3	0.5	1.3	1.0	1.3
	DSP Engine Peak Perf – FP32	TFLOPs	0.1	0.3	0.5	0.7	2.1	1.6	2.1
	NoC Cross-Sectional Bandwidth	Tb/s	0.6	0.6	0.6	0.6	1.7	1.7	1.7
Processing System	Arm® Cortex-A72 Performance	DMIPs	18,942	18,942	18,942	18,942	18,942	19,516	19,516
	Arm Cortex-R5F Performance	DMIPs	2,672	2,672	2,672	2,672	2,672	2,672	2,672
Memory	Total Bandwidth - Block RAM	Tb/s	3	7	16	22	137	69	86
	Total Bandwidth - UltraRAM	Tb/s	3	5	11	16	49	24	28
	Total Bandwidth - Accelerator RAM	Tb/s	0.4	0.4	0.4	0.4	–	–	–
	Total SRAM Bandwidth	Tb/s	6	12	27	39	186	92	114
	DDR4 Memory Bandwidth	GB/s	25.6	25.6	25.6	25.6	76.8	76.8	76.8
	LPDDR4 Memory Bandwidth	GB/s	34.1	34.1	34.1	34.1	102.4	102.4	102.4
I/O	Transceiver Bandwidth	Tb/s	–	–	0.51	0.51	2.48	2.10	2.10
	Sensor I/O Bandwidth	Gb/s	269	269	269	269	941	960	960

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AMD Versal™ AI Edge Series Gen 2 – Resources

		2VE3304	2VE3358	2VE3358TR	2VE3504	2VE3558	2VE3558TR	2VE3804	2VE3858	2VE3858TR
AI Engine	AI Engine-ML v2 Tiles	24	24	24	96	96	96	144	144	144
	AIE-ML v2 Data Memory (Mb)	12	12	12	48	48	48	72	72	72
	AIE-ML v2 Shared Memory (Mb)	48	48	48	96	96	96	288	288	288
Processing System	#APU Cores / #RPU Cores	4 / 4	8 / 10	8 / 10	4 / 4	8 / 10	8 / 10	4 / 4	8 / 10	8 / 10
	Application Processing Unit	Arm® Cortex®-A78AE, 64 KB I w/parity & D w/ECC L1 Cache, 512 KB L2 Cache, 1 MB L3 Cache (per 2-core cluster), CMN600 w/4 MB Last-Level Cache (shared)								
	Real-Time Processing Unit	Arm Cortex-R52, 32 KB L1 Cache w/ECC, 128 KB TCM w/ECC								
	Memory	2 MB On-Chip Memory w/ECC								
	High-Speed Connectivity	PCI Express® Gen5 x4[1], USB 3.2, DisplayPort™ 1.4, 10G Ethernet, 1G Ethernet, UFS 3.1								
	General Connectivity	CAN/CAN-FD, SPI, UART, USB 2.0, I2C/I3C, GPIO								
Programmable Logic	System Logic Cells	206,920	206,920	206,920	492,188	492,188	492,188	1,188,040	1,188,040	1,188,040
	LUTs	94,592	94,592	94,592	225,000	225,000	225,000	543,104	543,104	543,104
	DSP Engines	184	184	184	700	700	700	2,064	2,064	2,064
	NoC Master / NoC Slave Ports	4	4	4	7	7	7	24	24	24
	Distributed RAM (Mb)	2.9	2.9	2.9	6.9	6.9	6.9	16.6	16.6	16.6
Memory	Total Block RAM (Mb)	5.0	5.0	5.0	13.6	13.6	13.6	47.2	47.2	47.2
	UltraRAM (Mb)	13.2	13.2	13.2	3.4	3.4	3.4	33.2	33.2	33.2
	Total PL Memory (Mb)	21.1	21.1	21.1	23.9	23.9	23.9	97.0	97.0	97.0
	DDR Memory Controllers (DDRMC5E)	3	3	3	4	4	4	5	5	5
	DDR Bus Width	96	96	96	128	128	128	160	160	160
Video and Imaging IP	GPU (4-core Arm Mali™-G78AE)	1	1	1	1	1	1	1	1	1
	Video Codec Unit (VCU)	–	1	1	–	1	1	–	1	1
	Image Signal Processor	–	1	1	–	3	3	–	3	3
Security	Backside Protection with Cryptographic Binding	–	–	✓	–	–	✓	–	–	✓
Transceivers	GTYP (PL only)	4	4	4	12	12	12	20	20	20
	PS-Dedicated Transceivers[2]	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR	4 x GTYP, 4 x GTR
Integrated Connectivity IP	PCI Express (PL PCIE5)	1 x Gen5 x4	1 x Gen5 x4	1 x Gen5 x4	3 x Gen5 x4	3 x Gen5 x4	3 x Gen5 x4	4 x Gen5 x4	4 x Gen5 x4	4 x Gen5 x4
	100G Multirate Ethernet MAC	1	1	1	1	1	1	3	3	3
Ordering Information	Extended Temp[3]	-1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE								
	Industrial Temp[3]	-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2LLI								

1. PS-dedicated PCIe Gen 5 support is provided by the MDB5 hard IP block.
2. PS-dedicated transceivers connectivity: GTYP: 10G Ethernet, PCI Express, and HSDP; GTR: USB and DisplayPort™.
3. In extended and industrial temperature grades, some ordering combinations can operate for a limited time with a junction temperature of 110°C. Timing parameters adhere to the same speed file at 110°C as they do below 110°C, regardless of operating voltage. Operation at 110°C Tj is limited to 3% of the device lifetime and can occur sequentially or at regular intervals as long as the total time does not exceed 3% of device lifetime.

All parameters listed are maximum values. Verify all data in this document with the device data sheets or product guides.

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AMD Versal™ AI Edge Series Gen 2 – Packaging

			2VE3304	2VE3358	2VE3358TR	2VE3504	2VE3558	2VE3558TR	2VE3804	2VE3858	2VE3858TR
Package Footprint	Package Dimensions (mm)	Ball Pitch (mm)	X5IO DDR Only, X5IO DDR+PL, X5IO PL Only HDIO, MIO GTYP (PL Only), GTYP (PS Only), GTR								
SFVA1089	27 x 27	0.8	176, 48, 32 22, 78 4, 4, 4	176, 48, 32 22, 78 4, 4, 4							
SFVA1440	31 x 31	0.8		168, 64, 32 44, 78 4, 4, 4			192, 136, 0 88, 78 4, 4, 4				
SSVA1440	31 x 31	0.8	168, 64, 32 44, 78 4, 4, 4	168, 64, 32 44, 78 4, 4, 4		192, 136, 0 88, 78 4, 4, 4	192, 136, 0 88, 78 4, 4, 4				
SSVC1440	31 x 31	0.8		164, 68, 32 44, 78 4, 4, 4	164, 68, 32 44, 78 4, 4, 4						
SSVL1760	35 x35	0.8		168, 64, 32 44, 78 4, 4, 4	168, 64, 32 44, 78 4, 4, 4		192, 136, 0 88, 78 4, 4, 4	192, 136, 0 88, 78 4, 4, 4			
SSVA2112	37.5 x 37.5	0.8				232, 152, 0 44, 78 12, 4, 4	232, 152, 0 44, 78 12, 4, 4		208, 272, 32 44, 78 20, 4, 4	208, 272, 32 44, 78 20, 4, 4	
SSVA2397	40 x 40	0.8					232, 152, 0 44, 78 12, 4, 4	232, 152, 0 44, 78 12, 4, 4		208, 272, 32 44, 78 20, 4, 4	208, 272, 32 44, 78 20, 4, 4

All parameters listed are maximum values. Verify all data in this document with the device data sheets or product guides.

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AMD Versal™ AI Edge Series Gen 2 – Figures of Merit

			2VE3304	2VE3358 2VE3358TR	2VE3504	2VE3558 2VE3558TR	2VE3804	2VE3858 2VE3858TR
AI Engine	AI Engine Peak Perf – INT8 (Dense)	TOPS	30.7	30.7	122.9	122.9	184.3	184.3
	AI Engine Peak Perf – INT8 (Max Sparsity)	TOPS	61.4	61.4	245.8	245.8	368.6	368.6
	AI Engine Peak Perf – INT16	TOPS	7.7	7.7	30.7	30.7	46.1	46.1
	AI Engine Peak Perf – MX6	TFLOPS	61.4	61.4	245.8	245.8	368.6	368.6
	AI Engine Peak Perf – MX9	TFLOPS	30.7	30.7	122.9	122.9	184.3	184.3
	AI Engine Peak SRAM Bandwidth	Tb/s	32	32	128	128	192	192
Programmable Logic	DSP Engine Peak Perf – INT8	TOPS	1.3	1.3	4.8	4.8	14.2	14.2
	DSP Engine Peak Perf – INT24	TOPS	0.4	0.4	1.6	1.6	4.7	4.7
	DSP Engine Peak Perf – CINT18	Complex TOPS	0.2	0.2	0.7	0.7	2.0	2.0
	DSP Engine Peak Perf – FP32	TFLOPS	0.3	0.3	1.1	1.1	3.3	3.3
	NoC Cross-Sectional Bandwidth	Tb/s	0.6	0.6	0.6	0.6	1.7	1.7
Processing System	Arm® Cortex-A78AE Performance	DMIPs	100,144	200,288	100,144	200,288	100,144	200,288
	Arm Cortex-R52 Performance	DMIPs	11,424	28,560	11,424	28,560	11,424	28,560
Memory	Total Bandwidth - Block RAM	Tb/s	20	20	56	56	193	193
	Total Bandwidth - UltraRAM	Tb/s	5	5	1	1	13	13
	Total SRAM Bandwidth	Tb/s	25	25	57	57	206	206
	DDR5 Memory Bandwidth	GB/s	76.8	76.8	102.4	102.4	128.0	128.0
	LPDDR5X Memory Bandwidth	GB/s	102.4	102.4	136.5	136.5	170.7	170.7
I/O	Transceiver Bandwidth	Tb/s	0.52	0.52	1.05	1.05	1.57	1.57
	Sensor I/O Bandwidth	Gb/s	432	504	612	612	1,368	1,368

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AMD Versal™ Portfolio Inter-Series Migration

Package Name	Footprint	Versal AI Edge Series							Versal AI Core Series						Versal Prime Series									Versal Premium Series											
		VE2002	VE2102	VE2202	VE2302	VE1752	VE2602	VE2802	VC1502	VC1702	VC1802	VC1902	VC2602	VC2802	VM1102	VM1302	VM1402	VM1502	VM1802	VM2202	VM2302	VM2502	VM2902	VP1002	VP1052	VP1102	VP1202	VP1402	VP1502	VP2502	VP1552	VP1702	VP1802	VP2802	VP1902
SFVA784	A784	■	■	■	■										■																				
NSVG1369	G1369					■			■	■																									
NSVH1369	H1369						■	■					■	■						■															
VSVA1596[1]	A1596[2]					■			■	■	■																								
VIVA1596[1]	A1596[2]										■	■																							
VSVD1760	D1760										■	■						■	■	■															
VFVF1760	F1760																				■	■	■	■	■	■	■	■							
VSVH1760	H1760						■	■					■	■																					
VSVA2197	A2197					■			■	■	■	■							■	■															

Versal™ Portfolio Migration Legend
■ Device
— Migration Path

Package Name	Footprint	Versal AI Edge Series Gen 2						Versal Prime Series Gen 2			
		2VE3304	2VE3358	2VE3504	2VE3558	2VE3804	2VE3858	2VM3358	2VM3558	2VM3654	2VM3858
SFVA1089	A1089	■	■					■			
SFVA1440	A1440[2]		■		■						
SSVA1440	A1440[2]	■	■	■	■			■	■		
SSVA2112	A2112			■	■	■	■		■	■	■

Notes:
1. VSVA1596 package dimensions are 37.5x37.5 mm, VIVA1596 package dimensions are 40x40 mm with 1.25 mm overhang.
2. Packages with the same last letter and number sequence, e.g., A1440, are footprint compatible with all other Versal devices with the same sequence.

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AMD Versal™ Device Ordering Information

Device Name						Device Attributes				Package Definition			
XC	2	V	E	3558	TR	-1	M	S	E	S	S	V	A2397
Device Grade XC: Commercial XA: Automotive XQ: Defense	**Generation**(1) 2: Gen 2	**Architecture** Versal	**Series Name** E: AI Edge C: AI Core M: Prime P: Premium H: HBM R: RF	**Device Number** Digits 1-3: Value Identifier Digit 4: # of Primary Cores	**Tamper Resistant**(2)	**Speed Grade** -1: Slowest -2: Mid -3: Highest	**Voltage** L: Low M: Mid H: High	**Static Screen** S: Standard L: Low Static	**Temp Grade** E: 0 to 110°C(3) I: –40 to 110°C(3) Q: –40 to +125°C M: –55 to +125°C	**Ball Pitch** L: 1.0 mm V: 0.92 mm, w/LSC N: 0.92 mm, no LSC S: 0.8 mm J: 0.65 mm	**Lid** S: Lidless, w/Stiffener Ring F: Lidded B: Lidless, no Stiffener Ring H: Lidded Overhang I: Lidless, w/Stiffener Ring & Overhang M: Lidless, w/ Stiffener Ring, w/ Memory on Package	**RoHS6 Code**(4) V: Pb-free Ball Q: Eutectic Ball R: Ruggedized, Eutectic Ball	**Footprint**

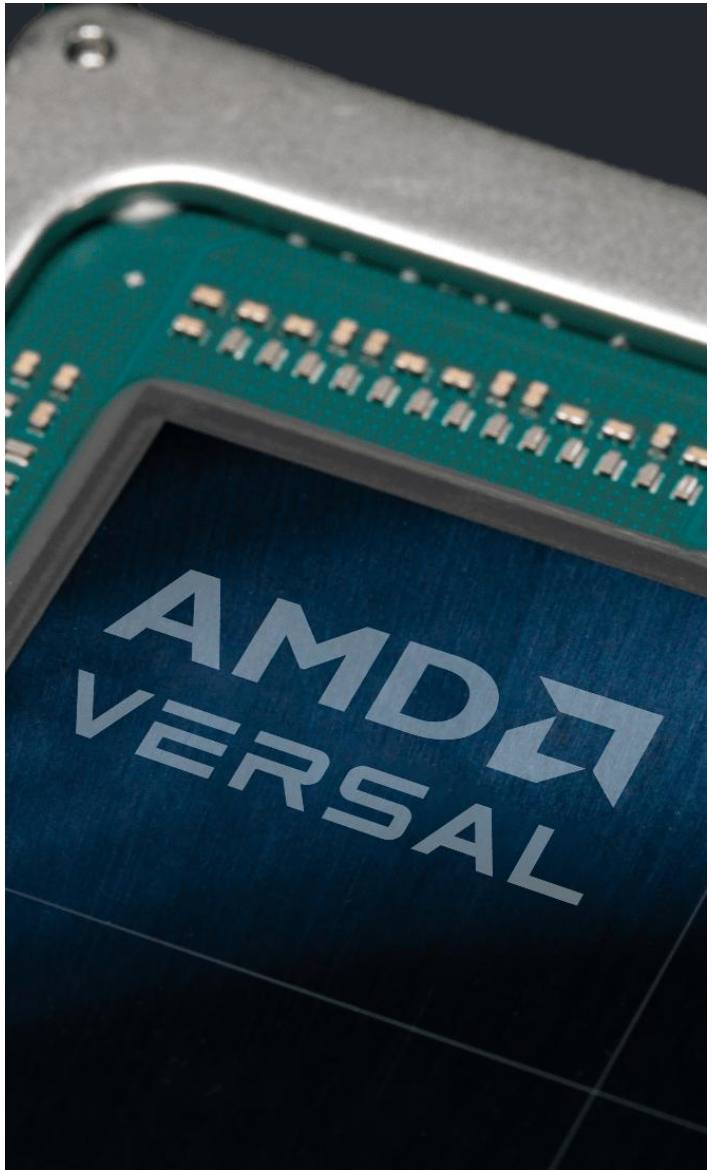
Note:

1. This character is only present in Versal AI Edge Series Gen 2, Prime Series Gen 2, and Premium Series Gen 2 devices.
2. Available in some AI Edge Series devices.
3. Operation at 110°C Tj is limited to 3% of the device lifetime and can occur sequentially or at regular intervals as long as the total time does not exceed 3% of device lifetime—except -1E and -3E (standard 0–100°C).
4. All packages have Pb-free bumps.

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AMD Versal™ Adaptive SoC Portfolio



Prime Series	**Mid-Range Devices with Option for High-End Scalar Compute** • Gen 1: Broad range of capabilities incl. PCIe® Gen 5, DDR5/LPDDR5[1] • **Gen 2:** Adds up to 10X scalar compute[2], LPDDR5X, VCU	General-Purpose
Premium Series	**High-End Devices Maximizing Connectivity, Hard IP, & DSP** • Gen 1: 112G SerDes, PCIe Gen 5, DDR4, High-Speed Crypto, AIE • **Gen 2:** Adds 128G SerDes, PCIe Gen 6, CXL® 3.1, DDR5/LPDDR5X	General-Purpose
HBM Series	**Adds Integrated HBM Memory to Premium Series Capabilties** • 8, 16, or 32 GB of HBM2e per device • 6X memory bandwidth at up to 65% lower power[3]	Specialized
AI Edge Series	**End-to-End Acceleration for AI-Driven Embedded Systems** • Gen 1: PL for preprocessing, AIE-ML for high-perf. inference • **Gen 2:** Adds up to 10X scalar compute[2] for postprocessing, add'l FuSa	Specialized
AI Core Series	**High-Throughput DSP & AI in a Mid-Size Footprint** • AIE for strong DSP performance/watt & perf/area • AIE-ML for high-performance inference w/PCIe Gen 5, 100 GbE	Specialized
RF Series	**Integrated RF-ADC/RF-DACs w/New DSP Hard IP** • 16 GSPS RF-DACs, 8 GSPS or 32 GSPS RF-ADCs, AIE • FFT/iFFT, Channelizer, LDPC, Frac. Resampler, Polyphase Filters	Specialized

1. DDR5/LPDDR5 support is available in the VM2152 device. All other first-generation Versal Prime Series devices support DDR4/LPDDR4/LPDDR4X.
2. Pre-silicon estimated performance. See Endnotes VER-027.
3. See Endnotes VER-013.

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