AMD Versal™ Prime Portfolio Product Selection Guide

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AMD Versal™ Prime Series – Resources

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

		VM1102	VM1302	VM1402	VM1502	VM1802	VM2152	VM2202	VM2302	VM2502	VM2902
Programmable Logic	System Logic Cells (K)	329	703	1,238	981	1,968	757	1,139	1,575	1,969	2,233
	LUTs	150,272	321,536	565,760	448,512	899,840	346,112	520,704	719,872	900,224	1,020,928
	DSP Engines	464	848	1,696	1,312	1,968	1,704	1,312	1,904	3,984	2,672
	NoC Master / NoC Slave Ports	5	9	18	21	28	12	21	30	28	42
	Distributed RAM (Mb)	5	10	17	14	27	11	16	22	27	31
Memory	Total Block RAM (Mb)	5	18	40	34	34	27	21	49	47	70
	Total UltraRAM (Mb)	44	50	80	130	130	54	74	127	190	181
	Total PL Memory (Mb)	54	78	137	178	191	92	111	198	264	282
	DDR4 Memory Controllers	1	2	4	3	4	-	3	3	4	2
	DDR5 Memory Controllers	–	–	–	–	–	4	–	–	–	–
	DDR Bus Widths	64	128	256	192	256	128	192	192	256	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); USB 2.0 (x1); UART (x2); SPI (x2); I2C (x2); CAN-FD (x2)									
Serial Transceivers	GTY Transceivers	0	24	24	44	44	0	0	0	0	0
	GTYP Transceivers	8	0	0	0	0	8	32(1)	8	16(1)	8
	GTM Transceivers (58G[2] (112G))	0	0	0	0	0	8 (4)	0	36 (0)	0	36 (0)
Integrated Protocol IP	PCIe® w/DMA (CPM4)	-	1 x Gen4x16	1 x Gen4x16	1 x Gen4x16	1 x Gen4x16	–	–	–	–	–
	PCIe w/DMA (CPM5)	–	–	–	–	–	–	2 x Gen5x8	–	2 x Gen5x8	–
	PCIe (PL PCIE4)	–	2 x Gen4x8	2 x Gen4x8	4 x Gen4x8	4 x Gen4x8	–	–	–	–	–
	PCIe (PL PCIE5)	1 x Gen4x8	–	–	–	–	2 x Gen5x4	4 x Gen5x4	2 x Gen5x4	-	2 x Gen5x4
	100G Multirate Ethernet MAC	1	2	2	4	4	2	2	6	-	6
	600G Ethernet MAC	–	–	–	–	–	1	–	–	–	–
	400G High Speed Crypto	–	–	–	–	–	1	–	–	–	–
Ordering Information	Extended Temp[3]	-1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE					-1MSE, -1LSE -2MSE, -2MLE -2LSE, -2LLE	-1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE	-1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE, -3HSE		
	Industrial Temp[3]	-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2LLI, -2HSI					-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2HSI	-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2LLI, -2HSI	-1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI		

1. 16 GTYP transceivers are dedicated to the CPM for PCI Express use.
2. 58G supported only in -3 speedgrade. For devices supporting up to -2 speedgrade, the maximum GT speed is 56G.
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.

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AMD Versal™ Prime Series – Packaging			VM1102	VM1302	VM1402	VM1502	VM1802	VM2152	VM2202	VM2302	VM2502	VM2902
Package	Package Dimensions (mm)	Ball Pitch (mm)	XPIO DDR Only, XPIO DDR+PL, XPIO PL Only HDIO, MIO GTY, GTYP, GTM (112G)					X5IO DDR Only, X5IO DDR+PL, X5IO PL Only HDIO, MIO GTY, GTYP, GTM (112G)	XPIO DDR Only, XPIO DDR+PL, XPIO PL Only HDIO, MIO GTY, GTYP, GTM (112G)			
SFVA784	23x23	0.8	132, 30, 54 22, 78 0, 8, 0									
NBVB1024	31x31	0.92		132, 84, 0 22, 78 16, 0, 0	132, 192, 0 22, 78 16, 0, 0							
NFVD1024	31x31	0.92						136, 120, 0 22, 78 0, 8, 8 (4)				
NFVB1369	35x35	0.92				132, 246, 0 22, 78 16, 0, 0						
NSVF1369	35x35	0.92		168, 156, 0 22, 78 8, 0, 0	168, 480, 0 22, 78 8, 0, 0							
NSVH1369	35x35	0.92							132, 192, 0 44, 78 0, 32, 0			
NFVM1369	35x35	0.92						136, 248, 0 44, 78 0, 8, 8 (4)				
VFVC1596	37.5x37.5	0.92		168, 264, 0 22, 78 24, 0, 0	168, 480, 0 22, 78 24, 0, 0							
VFVC1760[1]	40x40	0.92				132, 246, 0 44, 78 44, 0, 0	132, 246, 0 44, 78 44, 0, 0					
VSVD1760[2,3]	40x40	0.92		168, 156, 0 0, 78 16, 0, 0	168, 480, 0 0, 78 16, 0, 0		186, 462, 0 0, 78 24, 0, 0					
VFVF1760[4]	40x40	0.92								132, 192, 0 0, 78 0, 8, 36 (0)		132, 192, 0 22, 78 0, 8, 36 (0)
VSVI1760	40x40	0.92									132, 516, 0 0, 78 0, 16, 0	
VSVA2197	45x45	0.92				192, 294, 0 44, 78 44, 0, 0	186, 462, 0 44, 78 44, 0, 0					

Notes:
1. Devices in VFVC1760 support peak LPDDR4 in 162 I/O only. The remaining 216 I/O support limited data rates. See the associated data sheet.
2. VM1302 in VSVD1760 supports peak LPDDR4 in 162 I/O only. The remaining 162 I/O support limited data rates. See the associated data sheet.
3. VM1402 in VSVD1760 supports peak LPDDR4 in 324 I/O only. The remaining 324 I/O support limited data rates. See the associated data sheet.
4. Some packages are compatible with Versal Premium series devices.

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™ Prime Series – Figures of Merit

			VM1102	VM1302	VM1402	VM1502	VM1802	VM2152	VM2202	VM2302	VM2502	VM2902
Programmable Logic	DSP Engine Peak Perf – INT8	TOPS	3.2	5.9	11.7	9.1	13.6	11.8	9.1	13.1	27.5	18.4
	DSP Engine Peak Perf – INT24	TOPS	1.1	2.0	3.9	3.0	4.5	3.9	3.0	4.4	9.2	6.1
	DSP Engine Peak Perf – CINT18	Complex TOPS	0.5	0.8	1.7	1.3	1.9	1.7	1.3	1.9	3.9	2.6
	DSP Engine Peak Perf – FP32	TFLOPs	0.7	1.4	2.7	2.1	3.2	2.7	2.1	3.1	6.4	4.3
	NoC Cross-sectional Bandwidth	Tb/s	0.6	1.1	1.1	1.7	2.2	1.1	1.7	2.8	1.9	3.9
Processing System	Arm® Cortex®-A72 Performance	DMIPs	18,942	18,942	18,942	18,942	18,942	18,942	18,942	19,516	19,516	19,516
	Arm Cortex-R5F Performance	DMIPs	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672	2,672
Memory	Total Bandwidth – Block RAM	Tb/s	22	72	166	137	139	109	86	202	193	285
	Total Bandwidth – UltraRAM	Tb/s	16	19	30	49	49	20	28	48	72	69
	Total SRAM Bandwidth	Tb/s	39	91	196	186	188	130	114	250	265	354
	DDR4 Memory Bandwidth	GB/s	25.6	51.2	102.4	76.8	102.4	–	76.8	76.8	102.4	76.8
	LPDDR4 Memory Bandwidth	GB/s	34.1	68.3	136.5	102.4	136.5	–	102.4	102.4	136.5	102.4
	DDR5 Memory Bandwidth	GB/s	–	–	–	–	–	89.6	–	–	–	–
	LPDDR5 Memory Bandwidth	GB/s	–	–	–	–	–	102.4	–	–	–	–
I/O	Transceiver Bandwidth	Tb/s	0.51	1.35	1.35	2.48	2.48	1.45	2.05	7.95	4.15	11.66
	Sensor I/O Bandwidth	Gb/s	269	845	1,536	941	1,478	794	960	979	1,824	979

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AMD Versal™ Prime Series Gen 2 – Resources

			Four-Core Application Processing Unit				Eight-Core Application Processing Unit		
			2VM3104	2VM3254	2VM3454	2VM3654	2VM3358	2VM3558	2VM3858
Processing System	# Application Cores / # Real-Time Cores		4 / 6				8 / 10		
	Application Core Type		Arm® Cortex®-A78AE, 64 KB I w/parity & D w/ECC L1 Cache, 512 KB L2 Cache						
	Real-Time Core Type		Arm Cortex-R52, 32 KB L1 Cache w/ECC, 128 KB TCM 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						
	Application Cores	Cores Per Cluster / #Clusters	4 / 1				2 / 4		
		L3 Cache Per Cluster (MB)	2				1		
		System-Level Cache (MB)	-				4		
	Real-Time Cores	Cores Per Cluster / #Clusters	2 / 3				2 / 5		
	On-Chip Memory w/ECC (MB)		1				2		
Programmable Logic	System Logic Cells		225,400	302,680	564,760	695,800	206,920	492,188	1,188,040
	LUTs		103,040	138,368	258,176	318,080	94,592	225,000	543,104
	DSP Engines		420	564	1,140	1,428	184	700	2,064
	Distributed RAM (Mb)		3.1	4.2	7.9	9.7	2.9	6.9	16.6
Memory	Block RAM (Mb)		6.2	8.3	17.5	22.2	4.9	13.6	47.2
	UltraRAM (Mb)		9.8	13.2	20.0	23.3	13.2	3.4	33.2
	Total PL Memory (Mb)		19.1	25.7	45.4	55.2	21.1	23.9	97.0
	32b DDR Memory Controllers (DDRMC5E)		1	1	1	1	3	4	5
	32b DDR Memory Controllers (DDRMC5X)		2	2	2	3	-	-	-
Video and Imaging IP	GPU Cores (Arm Mali™-G78AE)		1	1	1	1	4	4	4
	Video Codec Unit (VCU)		-	1	1	2	1	1	1
Transceivers	GTYP (PL only)		4	8	16	24	4	12	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
Integrated Connectivity IP	PCI Express (PL PCIE5)		-	1 x Gen5 x4	1 x Gen5 x4	2 x Gen5 x4	1 x Gen5 x4	3 x Gen5 x4	4 x Gen5 x4
	100G Multirate Ethernet MAC		1	1	2	2	1	1	3
	High-Speed Crypto Engine		-	-	1	1	-	-	-
Ordering Info	Available SKU Options[3]		-1MSE, -1MSI, -1MLI, -1LSE, -1LSI, -1LLI, -2MSE, -2MLE, -2MSI, -2MLI, -2LSE, -2LLE, -2LLI						

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

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.

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AMD Versal™ Prime Series Gen 2 – Packaging

			2VM3104	2VM3254	2VM3454	2VM3654	2VM3358	2VM3558	2VM3858
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						
JFVA1156	23 x 23	0.65	64, 128, 0 44, 78 4, 4, 4	64, 128, 0 44, 78 8, 4, 4					
SFVA1089	27 x 27	0.8					176, 48, 32 22, 78 4, 4, 4		
SFVA1221	29 x 29	0.8	64, 160, 0 22, 78 4, 4, 4	64, 160, 0 22, 78 8, 4, 4	64, 160, 0 22, 78 12, 4, 4	64, 160, 0 22, 78 12, 4, 4			
SSVA1440	31 x 31	0.8					168, 64, 32 44, 78 4, 4, 4	192, 136, 0 88, 78 4, 4, 4	
SFVB1440	31 x 31	0.8			56, 168, 0 22, 78 16, 4, 4	112, 176, 0 22, 78 24, 4, 4			
SSVA2112	37.5 x 37.5	0.8				112, 176, 0 22, 78 20, 4, 4		232, 152, 0 44, 78 12, 4, 4	208, 272, 32 44, 78 20, 4, 4

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AMD Versal™ Prime Series Gen 2 – Figures of Merit

			2VM3104	2VM3254	2VM3454	2VM3654	2VM3358	2VM3558	2VM3858
Programmable Logic	DSP Engine Peak Perf – INT8	TOPS	2.9	3.9	7.9	9.9	1.3	4.8	14.2
	DSP Engine Peak Perf – INT24	TOPS	1.0	1.3	2.6	3.3	0.4	1.6	4.7
	DSP Engine Peak Perf – CINT18	Complex TOPS	0.4	0.6	1.1	1.4	0.2	0.7	2.0
	DSP Engine Peak Perf – FP32	TFLOPS	0.7	0.9	1.8	2.3	0.3	1.1	3.3
	NoC Cross-Sectional Bandwidth	Tb/s	0.6	0.6	0.6	0.6	0.6	0.6	1.7
Processing System	Arm® Cortex-A78AE Performance	DMIPs	100,144	100,144	100,144	100,144	200,288	200,288	200,288
	Arm Cortex-R52 Performance	DMIPs	17,136	17,136	17,136	17,136	28,560	28,560	28,560
Memory	Total Bandwidth - Block RAM	Tb/s	25	34	72	91	20	56	193
	Total Bandwidth - UltraRAM	Tb/s	4	5	8	9	5	1	13
	Total SRAM Bandwidth	Tb/s	29	39	79	100	25	57	206
	DDR5 Memory Bandwidth	GB/s	102.4	102.4	76.8	102.4	76.8	102.4	128.0
	LPDDR5X Memory Bandwidth	GB/s	136.5	136.5	102.4	136.5	102.4	136.5	170.7
I/O	Transceiver Bandwidth(1)	Tb/s	0.51	0.77	1.28	1.79	0.51	1.02	1.54
	Sensor I/O Bandwidth	Gb/s	720	720	756	864	504	684	1,368

1. Transceiver bandwidth includes GTYP transceivers only.

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™ 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	-1	M	S	E	S	B	V	A1440
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	**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[2] I: –40 to 110°C[2] 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** [3] V: Pb-free Ball Q: Eutectic Ball R: Ruggedized, Eutectic Ball	**Footprint**

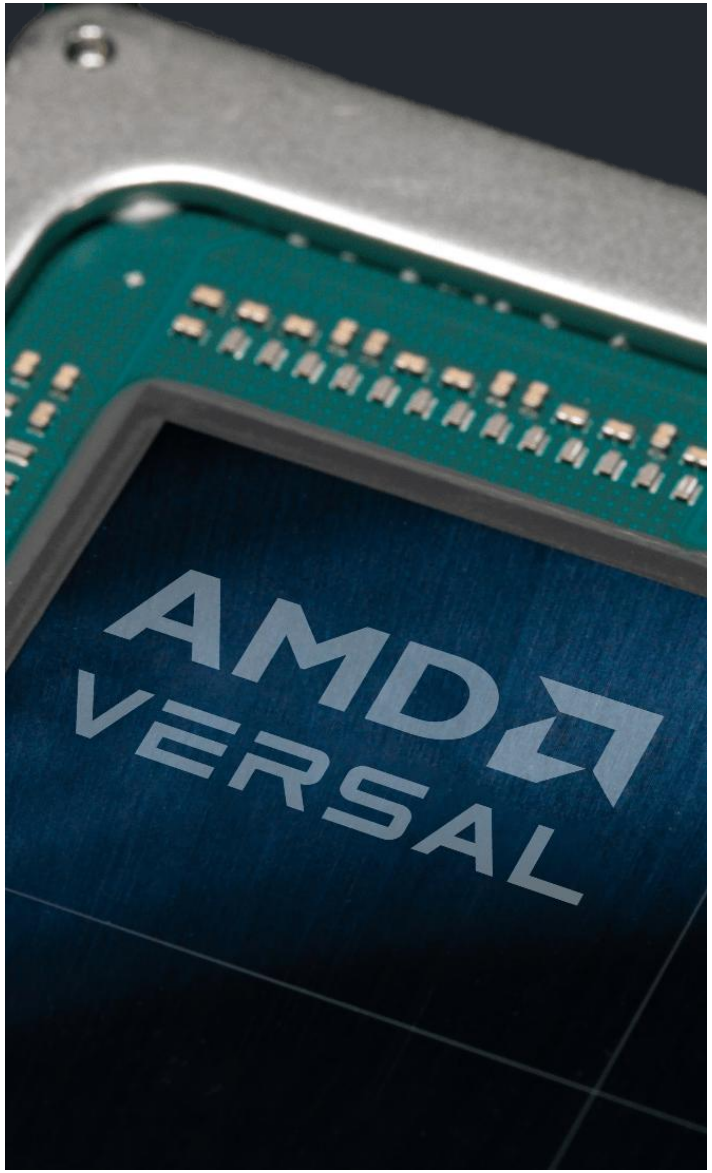
Note:

1. This character is only present in Versal AI Edge Series Gen 2, Prime Series Gen 2, and Premium Series Gen 2 devices.
2. 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).
3. 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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