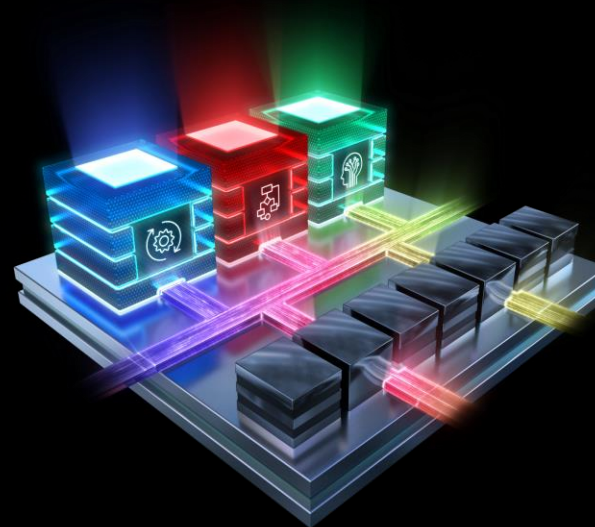




# Versal® ACAP AI Edge Series Product Selection Guide



# Versal® AI Edge Series – Resources

|                        |                              | VE2002                                                                             | VE2102 | VE2202     | VE2302     | VE1752            | VE2602                                          | VE2802            |
|------------------------|------------------------------|------------------------------------------------------------------------------------|--------|------------|------------|-------------------|-------------------------------------------------|-------------------|
| Intelligent Engines    | 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)    | 48                                                                                 | 48     | 68         | 68         | 0                 | 304                                             | 304               |
|                        | DSP Engines                  | 90                                                                                 | 176    | 324        | 464        | 1,312             | 984                                             | 1,312             |
| Adaptable Engines      | 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           |
|                        | NoC Master / NoC Slave Ports | 2                                                                                  | 2      | 5          | 5          | 21                | 21                                              | 21                |
|                        | 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       | 1                                                                                  | 1      | 1          | 1          | 3                 | 3                                               | 3                 |
|                        | DDR Bus Width                | 64                                                                                 | 64     | 64         | 64         | 192               | 192                                             | 192               |
| Scalar Engines         | Application Processing Unit  | Dual-core Arm® Cortex-A72, 48KB/32KB L1 Cache w/ parity & ECC; 1MB L2 Cache w/ ECC |        |            |            |                   |                                                 |                   |
|                        | Real-Time Processing Unit    | Dual-core Arm Cortex-R5F, 32KB/32KB L1 Cache, and 256KB TCM w/ECC                  |        |            |            |                   |                                                 |                   |
|                        | Memory                       | 256KB 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                 |
|                        | GTYT Transceivers            | 0                                                                                  | 0      | 8          | 8          | 0                 | 32 <sup>(1)</sup>                               | 32 <sup>(1)</sup> |
| Integrated Protocol IP | CCIX & PCIe® w/DMA (CPM)     | -                                                                                  | -      | -          | -          | 1 x Gen4x16, CCIX | 1 x Gen4x16, CCIX                               | 1 x Gen4x16, CCIX |
|                        | PCI Express®                 | -                                                                                  | -      | 1 x Gen4x8 | 1 x Gen4x8 | 4 x Gen4x8        | 4 x Gen4x8                                      | 4 x Gen4x8        |
|                        | 40G Multirate Ethernet MAC   | 0                                                                                  | 0      | 1          | 1          | 2                 | 2                                               | 2                 |
|                        | Video Decoder Engines (VDEs) | —                                                                                  | —      | —          | —          | —                 | 2                                               | 4                 |
|                        | Platform Mgmt Controller     | Boot, Security, Safety, Monitoring, and High-Speed Debug                           |        |            |            |                   |                                                 |                   |
| Ordering Information   | Extended Temp <sup>2</sup>   | -1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE                                           |        |            |            |                   | -1MSE, -1LSE, -2MSE, -2MLE, -2LSE, -2LLE, -3HSE |                   |
|                        | Industrial Temp <sup>2</sup> | -1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI, -2LLI, -2HSI                             |        |            |            |                   | -1MSI, -1MLI, -1LSI, -1LLI, -2MSI, -2MLI        |                   |

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.

# 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<br>HDIO, MIO<br>GTY, GTYP |                          |                           |                           |                             |                             |                             |
| SBVA484                 | 19x19                   | 0.8             | 84, 30<br>0, 78<br>0, 0                              | 84, 30<br>0, 78<br>0, 0  |                           |                           |                             |                             |                             |
| SBVA625                 | 21x21                   | 0.8             | 132, 84<br>0, 78<br>0, 0                             | 132, 84<br>0, 78<br>0, 0 |                           |                           |                             |                             |                             |
| SFVA784                 | 23x23                   | 0.8             | 132, 84<br>0, 78<br>0, 0                             | 132, 84<br>0, 78<br>0, 0 | 132, 84<br>22, 78<br>0, 8 | 132, 84<br>22, 78<br>0, 8 |                             |                             |                             |
| NSVG1369                | 35x35                   | 0.92            |                                                      |                          |                           |                           | 132, 246<br>44, 78<br>24, 0 |                             |                             |
| NSVH1369                | 35x35                   | 0.92            |                                                      |                          |                           |                           |                             | 132, 192<br>44, 78<br>0, 32 | 132, 192<br>44, 78<br>0, 32 |
| VSVA1596 <sup>(1)</sup> | 37.5x37.5               | 0.92            |                                                      |                          |                           |                           | 132, 246<br>44, 78<br>32, 0 |                             |                             |
| VSVH1760                | 40x40                   | 0.92            |                                                      |                          |                           |                           |                             | 186, 300<br>44, 78<br>0, 32 | 186, 300<br>44, 78<br>0, 32 |
| VSVA2197                | 45x45                   | 0.92            |                                                      |                          |                           |                           | 192, 294<br>44, 78<br>44, 0 |                             |                             |

Notes:

1. VE1752 in the VSVA1596 package supports peak LPDDR4 data rates in 324 I/O only. The remaining 54 I/O support limited data rates. See the associated data sheet.

# Versal® AI Edge Series – Figures of Merit

|                     |                                   |              | VE2002 | VE2102 | VE2202 | VE2302 | VE1752 | VE2602 | VE2802 |
|---------------------|-----------------------------------|--------------|--------|--------|--------|--------|--------|--------|--------|
| Intelligent Engines | AI Engine Peak Perf – INT8x4      | TOPs         | 11     | 16     | 32     | 45     | 101    | 202    | 405    |
|                     | AI Engine Peak Perf – INT8        | TOPs         | 5      | 8      | 16     | 23     | 101    | 101    | 202    |
|                     | AI Engine Peak Perf – INT8x16     | TOPs         | 3      | 4      | 11     | 11     | 51     | 101    | 101    |
|                     | AI Engine Peak Perf – INT16       | TOPs         | 1      | 2      | 4      | 6      | 25     | 25     | 51     |
|                     | AI Engine Peak Perf – CINT16      | Complex TOPs | 0.2    | 0.2    | 0.5    | 0.7    | 6.3    | 3.2    | 6.3    |
|                     | 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    |
|                     | 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    |
| Adaptable Engines   | DSP Engine Peak Perf – FP32       | TFLOPs       | 0.1    | 0.3    | 0.5    | 0.7    | 2.1    | 1.6    | 2.1    |
|                     | Adaptable Engine Peak Perf – INT4 | TOPs         | 2      | 5      | 13     | 19     | 56     | 47     | 65     |
|                     | Adaptable Engine Peak Perf – INT8 | TOPs         | 1      | 1      | 3      | 5      | 14     | 12     | 17     |
| Scalar Engines      | NoC Cross-sectional Bandwidth     | Tb/s         | 0.6    | 0.6    | 0.6    | 0.6    | 1.7    | 1.7    | 1.7    |
|                     | Arm® Cortex-A72 Performance       | DMIPs        | 18,942 | 18,942 | 18,942 | 18,942 | 18,942 | 19,516 | 19,516 |
| Memory              | Arm Cortex-R5F Performance        | DMIPs        | 2,672  | 2,672  | 2,672  | 2,672  | 2,672  | 2,672  | 2,672  |
|                     | Total Bandwidth - Block RAM       | Tb/s         | 3      | 7      | 16     | 22     | 137    | 69     | 86     |
|                     | Total Bandwidth - Ultra RAM       | Tb/s         | 3      | 5      | 11     | 16     | 49     | 24     | 28     |
|                     | Total Bandwidth - Accelerator RAM | Tb/s         | 0.4    | 0.4    | 0.4    | 0.4    | 0      | 0      | 0      |
|                     | 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   |
| I/O                 | LPDDR4 Memory Bandwidth           | GB/s         | 34.1   | 34.1   | 34.1   | 34.1   | 102.4  | 102.4  | 102.4  |
|                     | Transceiver Bandwidth             | Tb/s         | 0      | 0      | 0.51   | 0.51   | 2.48   | 2.10   | 2.10   |
|                     | Sensor I/O Bandwidth              | Gb/s         | 269    | 269    | 269    | 269    | 941    | 960    | 960    |

# Versal® ACAP Migration Table

| Package Name            | Footprint | Versal AI Edge Series |        |        |        |        |        |        | Versal AI Core Series |        |        |        |        |        |        | Versal Prime Series |        |        |        |        |        |        |        | Versal Premium Series |        |        |        |        |        |        |        |   |
|-------------------------|-----------|-----------------------|--------|--------|--------|--------|--------|--------|-----------------------|--------|--------|--------|--------|--------|--------|---------------------|--------|--------|--------|--------|--------|--------|--------|-----------------------|--------|--------|--------|--------|--------|--------|--------|---|
|                         |           | VE2002                | VE2102 | VE2202 | VE2302 | VE1752 | VE2602 | VE2802 | VC1352                | VC1502 | VC1702 | VC1802 | VC1902 | VC2602 | VC2802 | VM1102              | VM1302 | VM1402 | VM1502 | VM1802 | VM2202 | VM2302 | VM2502 | VM2902                | VP1102 | VP1202 | VP1402 | VP1502 | VP1552 | VP1702 | VP1802 |   |
| SBVA484                 | A484      | ■                     | ■      |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| SBVA625                 | A625      | ■                     | ■      |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| SFVA784                 | A784      | ■                     | ■      | ■      | ■      |        |        |        |                       |        |        |        |        |        | ■      |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NBVA1024                | A1024     |                       |        |        |        |        |        |        | ■                     |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NBVB1024                | B1024     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        | ■                   | ■      |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NFVB1369                | B1369     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        | ■      |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NSVE1369                | E1369     |                       |        |        |        |        |        |        | ■                     |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NSVF1369                | F1369     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        | ■                   | ■      |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NSVG1369                | G1369     |                       |        |        |        | ■      |        |        |                       |        | ■      | ■      |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| NSVH1369                | H1369     |                       |        |        |        |        | ■      | ■      |                       |        |        |        |        | ■      | ■      |                     |        |        |        |        | ■      |        |        |                       |        |        |        |        |        |        |        |   |
| VSVA1596 <sup>(1)</sup> | A1596     |                       |        |        |        | ■      |        |        |                       |        | ■      | ■      |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VIVA1596 <sup>(1)</sup> | A1596     |                       |        |        |        |        |        |        |                       |        |        |        | ■      | ■      |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VFVC1596                | C1596     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        | ■                   | ■      |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VFVC1760                | C1760     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        | ■      | ■      |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VSVD1760                | D1760     |                       |        |        |        |        |        |        |                       |        | ■      | ■      |        |        |        | ■                   | ■      |        | ■      |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VFVF1760                | F1760     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        | ■      |        | ■      |                       | ■      |        | ■      |        |        |        |        |   |
| VFVH1760                | H1760     |                       |        |        |        |        | ■      | ■      |                       |        |        |        |        | ■      | ■      |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VSVI1760                | I1760     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        | ■      |        |                       |        |        |        |        |        |        |        |   |
| VSVA2197                | A2197     |                       |        |        |        | ■      |        |        |                       |        | ■      | ■      | ■      | ■      |        |                     |        | ■      | ■      |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VSVD2197                | D2197     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        |   |
| VSVA2785                | A2785     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       | ■      | ■      | ■      | ■      | ■      |        |        |   |
| VSVA3112                | A3112     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        | ■      |        |        |        |        |   |
| VSVA3340                | A3340     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        | ■      | ■      | ■      | ■      |        |        |   |
| LSVC4072                | C4072     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        |        |        | ■ |
| VSVA5601                | A5601     |                       |        |        |        |        |        |        |                       |        |        |        |        |        |        |                     |        |        |        |        |        |        |        |                       |        |        |        |        |        | ■      | ■      |   |

Legend

■ Device

— Migration Path

Note:

1. VSVA1596 package dimensions are 37.5x37.5mm, VIVA1596 package dimensions are 40x40mm with 1.25mm overhang

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# Versal® ACAP Ordering Information

| Device Name                                                            |                               |                                                                                    |                                                                                     | Device Attributes                                           |                                                                      |                                                      |                                                                                                                             | Package Definition                                                                 |                                                                                                                                                           |                                                                                                         |                  |
|------------------------------------------------------------------------|-------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------|
| XC                                                                     | V                             | C                                                                                  | 1902                                                                                | -1                                                          | M                                                                    | S                                                    | E                                                                                                                           | V                                                                                  | S                                                                                                                                                         | V                                                                                                       | D1760            |
| <b>Device Grade</b><br>XC: Commercial<br>XA: Automotive<br>XQ: Defense | <b>Architecture</b><br>Versal | <b>Series Name</b><br>E: AI Edge<br>C: AI Core<br>M: Prime<br>P: Premium<br>H: HBM | <b>Device Number</b><br>Digits 1-3: Value Identifier<br>Digit 4: # of Primary Cores | <b>Speed Grade</b><br>-1: Slowest<br>-2: Mid<br>-3: Highest | <b>Voltage</b><br>L: Low (0.7V)<br>M: Mid (0.80V)<br>H: High (0.88V) | <b>Static Screen</b><br>S: Standard<br>L: Low Static | <b>Temp Grade</b><br>E: 0 to 110°C <sup>(1)</sup><br>I: -40 to 110°C <sup>(1)</sup><br>Q: -40 to +125°C<br>M: -55 to +125°C | <b>Ball Pitch</b><br>V: 0.92mm, w/LSC<br>N: 0.92mm, no LSC<br>S: 0.8mm<br>L: 1.0mm | <b>Lid</b><br>S: Lidless, w/Stiffener Ring<br>F: Lidded<br>B: Lidless, no Stiffener Ring<br>H: Lidded Overhang<br>I: Lidless, w/Stiffener Ring & Overhang | <b>RoHS6 Code</b> <sup>(2)</sup><br>V: Pb-free Ball<br>Q: Eutectic Ball<br>R: Ruggedized, Eutectic Ball | <b>Footprint</b> |

Note:

1. 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).

2. All packages have Pb-free bumps.



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