

## Production-Ready, Agilex™ 5 FPGA System-on-Module (SoM) Portfolio from Altera's Partner Ecosystem

Providing unmatched time to market from development through production.



### Executive Summary

Agilex™ 5 FPGA-based system-on-modules (SoMs) are production-ready solutions, available from Intel partners, targeting embedded applications. SoMs featuring the industry-leading Agilex 5 FPGA address the growing demand for edge applications that require higher performance in a lower power footprint. SoMs drastically simplify and expedite embedded solution development and are an ideal starting point to reduce risks associated with board design and verification, while expediting time to market.

### SoMs

SoMs are small, highly integrated single-board computers that incorporate all the core components of an embedded processing system, including processors, DRAM, flash memory, power management, interface controllers, and board support package (BSP) software. SoMs are production-ready boards that enable developers to create a fully customized embedded design that can be easily integrated into end systems. SoMs are typically mounted to a baseboard, often referred to as a carrier board (CB), which is used to access the SoM interface for evaluation, test, and debug.

SoMs are distinct from a system-on-a-chip (SoC), which typically integrates a CPU, RAM, storage, and peripherals into a single silicon chip. SoCs are a singular chip, whereas SoMs are a board-level system that typically integrate multiple chips and components.

### FPGA-based SoMs

FPGA-based SoMs provide the unique advantage of allowing developers to adapt to evolving requirements by leveraging the re-programmability of the FPGA architecture. This means developers can avoid costly and time-consuming board redesigns while leveraging the parallel processing power of an FPGA. The flexibility and programmability of FPGAs also allow users to deploy the same SoM across multiple end products. In their small, highly efficient form factor, FPGA-based SoMs are well-suited for embedded applications.

### Author

**Tamara Lin**

Product Marketing Engineer  
Altera® Corporation

## SoMs Based on Agilex 5 FPGAs E-Series

By choosing an Agilex 5 FPGA-based SoM, developers reap the industry-leading power and performance benefits of Agilex 5 FPGAs, as well as unlock Altera's global partner ecosystem offering a wide variety of SoMs for a large range of applications. Altera partners offer solutions for edge deployment from development kits to production-ready solutions.



### Agilex 5 FPGA E-Series

#### Optimized Power-Efficient Performance

The Agilex 5 E-Series FPGA is designed to target midrange applications requiring lower power and higher performance more efficiently than previous generations of Intel edge-centric FPGAs. The Agilex 5 FPGA E-Series boasts 1.6X better performance per watt compared to competing 16 nm FPGAs in embedded, industrial, and vision applications<sup>1</sup>. This is enabled by the 2nd generation Hyperflex® FPGA Architecture combined with Altera's 7 nm process technology where transistors are optimized for performance per watt.

<sup>1</sup> For testing and specification information, refer to the Agilex FPGA Performance Index web page.

#### Enhanced DSP with AI Tensor Block

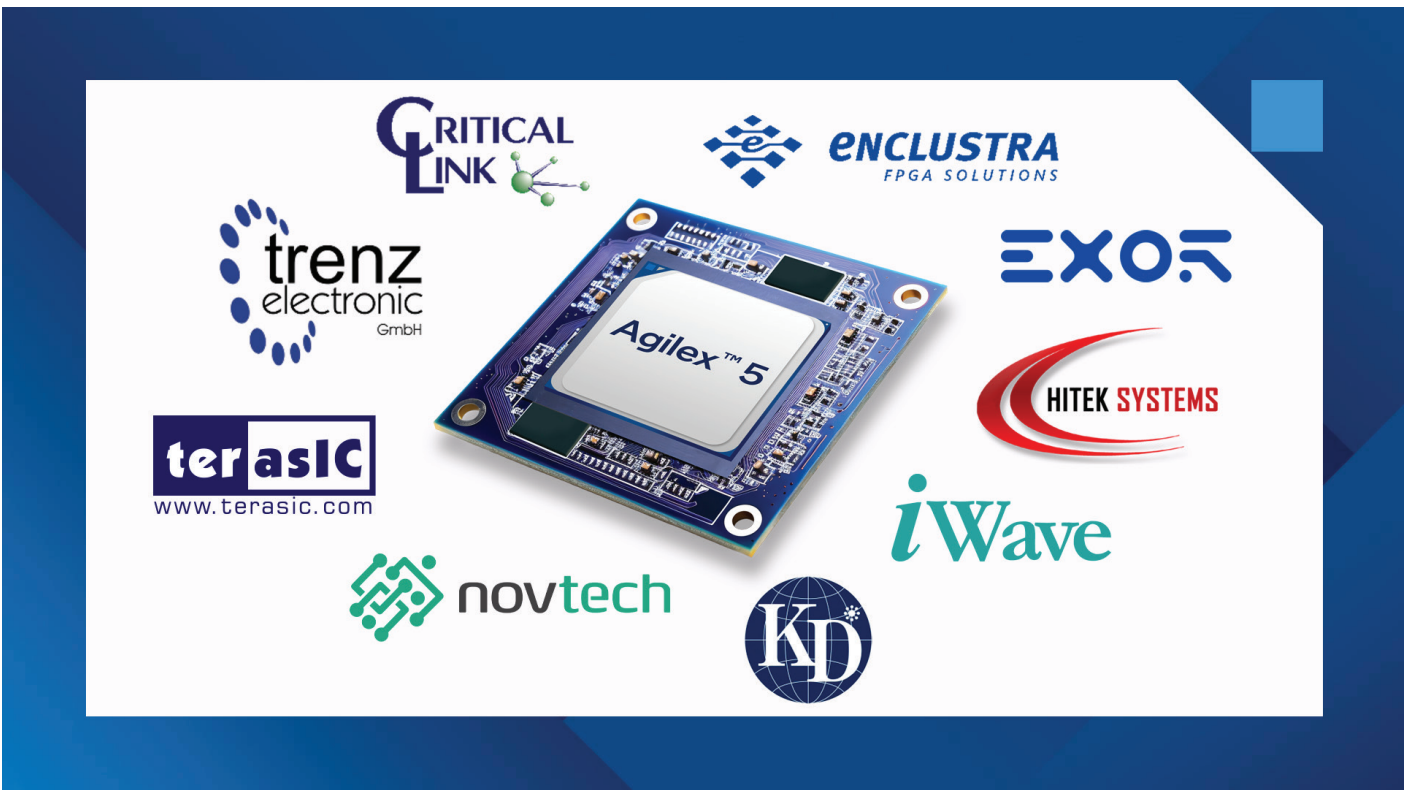
The digital signal processing (DSP) blocks designed in Agilex 5 devices have been completely redesigned to provide a 5X performance boost while maintaining the same die size compared to prior generations of DSP blocks, significantly increasing performance-per-watt.

#### Hard Processor Subsystem

The hard processor subsystem (HPS) has been upgraded to an asymmetric multi-core Arm Cortex\* processor with 2x Cortex-A55 and 2x Cortex-A76, allowing for a mix-and-match of core types using Arm's DynamIQ\* technology, enabling a wider range of performance options.

### Get Started

Agilex 5 FPGA E-Series SoMs offered by Altera partners can be found on the Intel Partner Showcase.



## Agilex 5 FPGA SoM Use Cases

SoMs designed with Agilex 5 FPGA E-Series can be used for a wide range of embedded applications.

Use Cases	Value Proposition
 <p data-bbox="156 596 719 657"><b>Industrial PC, Factory Automation, Control Systems, and Machine Vision</b></p>	<ul data-bbox="815 359 1453 600" style="list-style-type: none"> <li>▪ Available Arm processor subsystems support legacy industrial code</li> <li>▪ Support for multiple new and legacy industrial networking protocols</li> <li>▪ Diverse I/Os for multiple sensor fusion applications, including industrial camera interfaces</li> <li>▪ Long product life-cycle support (&gt;10 years)</li> </ul>
 <p data-bbox="137 947 743 1008"><b>Surveillance, Broadcast Equipment, and Retail Applications</b></p>	<ul data-bbox="815 701 1469 911" style="list-style-type: none"> <li>▪ Flexible low-latency video and vision IP</li> <li>▪ 600 MHz performance providing an easy path to 4K and 8K video designs</li> <li>▪ Diverse speed and power grade options</li> <li>▪ Hardened MIPI D-PHY* with soft CSI-2 RX and TX and DSI-2 TX</li> </ul>
 <p data-bbox="150 1295 727 1329"><b>Networking and Communication Equipment</b></p>	<ul data-bbox="815 1043 1477 1350" style="list-style-type: none"> <li>▪ 25G SERDES meets network demands and adapts to evolving network protocols</li> <li>▪ Adapts to evolving communication protocols</li> <li>▪ Support for unique artificial intelligence/machine learning implementations through integrated DSP with AI Tensor blocks</li> <li>▪ Low power and thermals improve legacy product refreshes for coprocessing, board control, and I/O expansion</li> </ul>
 <p data-bbox="213 1640 667 1673"><b>Test and Measurement Equipment</b></p>	<ul data-bbox="815 1386 1453 1575" style="list-style-type: none"> <li>▪ Support for latest connectivity standards including hardened MIPI D-PHY</li> <li>▪ Hardened DDR5/LPDDR5 controller</li> <li>▪ Built-in I/O delay for automatic test equipment (ATE) applications</li> </ul>
 <p data-bbox="312 1961 561 1988"><b>Consumer Devices</b></p>	<ul data-bbox="815 1728 1422 1906" style="list-style-type: none"> <li>▪ Long product life (&gt;10 years)</li> <li>▪ Evolve to changing requirements and standards</li> <li>▪ Customer image transcoding in FPGA</li> <li>▪ Adapts to support new and evolving protocols and standards</li> </ul>

## Why use an FPGA-based SoM as a Starting Point for Your Embedded Design?

### Fast Time to Market

- Leverage provided BSP and design examples to get started
- Maximize portability and design reuse by developing on production-ready hardware

### Low Risk

- Reduce risk associated with design, verification, and board bring-up by using a SoM from a trusted Altera partner
- Expect predictable design cycles and business results through simplified component sourcing on production-ready SoMs

### Versatile Ecosystem

- Leverage SoM providers that offer design services to customize your design from Altera's broad partner ecosystem
- Minimize hardware design and redesign effort with FPGA re-programmability and custom carrier boards

## Learn More

- [Intel Partner Showcase](#)
- [Agilex 5 FPGA-based SoMs](#)
- [Agilex 5 FPGA and SoC FPGA E-Series](#)



Altera technologies may require enabled hardware, software or service activation.

No product or component can be absolutely secure.

Your costs and results may vary.

© Altera Corporation. Altera, the Altera logo, the 'a' logo, and other Altera marks are trademarks of Altera Corporation. Other names and brands may be claimed as the property of others.