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Avnet Embedded Provides Server-Class Performance and Ruggedness in a COM-HPC Module for ATE and Dataloggers

Enabled by Intel® Xeon® D-1700 processors, the Avnet Embedded MSC HSD-ILDL module drives performance, memory capacity, expansion, and durability for automated testing and datalogger applications

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"COM-HPC is the perfect home for the new Intel® Xeon® D-1700 processor providing server class performance in embedded applications. With the new COM-HPC module MSC HSD-ILDL from Avnet Embedded featuring the Intel Xeon D-1700 processor, system designers now have the right tool that matches their needs for highest compute performance, extended IO bandwidth and flexible connectivity."

—Tim Jensen, senior director embedded product innovation at Avnet Embedded

Despite recent disruptions and challenges, the global electronics assembly and testing market is on the rise with a forecasted compound annual growth rate (CAGR) of 4.7 percent and valuation of USD 71M by 2028,[1] driven in part by the rise of automated testing. As sensors and embedded computers—heavily used in electronics assembly—become more ubiquitous in enterprise businesses and industrial environments, expectations for their performance and reliability are also increasing.

High-performance product qualification and testing instruments are essential to ensuring high quality and high output of consumer electronics and vehicles. These instruments need to acquire huge amounts of test data in short amounts of time, with uncompromising performance and reliability.

Challenge: Massive data, multiple interfaces

Automatic test equipment (ATE) used in production testing of electronic components and systems needs to deliver high I/O connectivity. The required connectivity scales with test pin count and signal bandwidth. Likewise, dataloggers used in automotive qualification have similar demands but with different interfaces that are designed for vehicle electronics and sensors.

In these and other demanding embedded applications, events and data can accrue at a high rate and require timely buffering and forwarding to mass storage without losing any single detail. These use cases need multiple PCIe and Ethernet ports with scalable bandwidth, along with a high-performance processor and storage that can cope with the large amount of data. Enterprises also need a solution that works with their existing infrastructure and add-in cards such as FPGAs, digital signal processing (DSP) cards, or analog-to-digital converters (ADCs).

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XEON®
D

Up to
2.32X
faster CPU performance[2]

Up to
5.73X
faster AI inferencing[3]

Intel® Xeon® D-1746TER processor vs. previous-generation Intel® Xeon® D-1539 processor.

For workloads and configurations, visit intel.com/PerformanceIndex. Results may vary.

Solution: The Avnet Embedded MSC HSD-ILDL module with Intel® Xeon® D-1700 processor

Enabled by the Intel Xeon D-1700 processor, the MSC HSD-ILDL COM-HPC module from Avnet Embedded delivers dense, server-class performance for embedded applications. ATE and datalogger applications will both benefit from the increased performance and memory capacity that Intel® Xeon® D processors have to offer. The soldered-down BGA package of the Intel® processor system-on-chip (SoC) allows for rugged, dependable embedded designs that are well suited for performance-hungry tasks. Many enterprises are already familiar with the computer-on-module (COM) approach, which allows for easy-to-integrate solutions, and the Intel® Xeon® D platform

provides up to 100GbE wired bandwidth and up to 32 high-speed PCIe lanes for strong connectivity and expandability.

Tim Jensen, senior director of embedded product innovation at Avnet Embedded, says, "COM-HPC is the perfect home for the new Intel Xeon D-1700 processor providing server-class performance in embedded applications. With the new COM-HPC module MSC HSD-ILDL from Avnet Embedded featuring the Intel Xeon D-1700 processor, system designers now have the right tool that matches their needs for highest compute performance, extended IO bandwidth, and flexible connectivity."

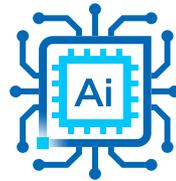## MSC HSD-ILDL COM-HPC module with Intel® Xeon® D-1700 processor key benefits

Fast results
Server-grade performance for embedded applications
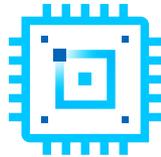
Reliable and rugged
Soldered-down BGA package, extended temps on select SKUs

Optimized for AI
Intel® Deep Learning Boost (VNNI) and Intel® AVX-512

Timely operations
Intel® Time Coordinated Computing (Intel® TCC) on select SKUs

How it works

Improved performance in embedded devices enables enterprises to drive fast results with high data volumes in small footprints. The MSC HSD-ILDL COM-HPC server module (size D) features the Intel Xeon D-1700 processor, a fully integrated SoC combining up to 10 processor cores, 16x PCIe 4.0 lanes, and 16x PCIe 3.0 lanes on a single socket. Up to eight Ethernet ports offer bandwidth up to 25GbE per port and an aggregated throughput of up to 100GbE.

The module delivers flexible expandability for FPGAs and high-capacity NVMe storage and up to 256 GB memory with 4x 64 GB DIMMs and error-correcting code (ECC) capability for more simultaneous applications and high uptime. Memory capacity is important for data-rich applications like ATE and automotive dataloggers, which can generate enough data to necessitate a 100GbE bandwidth pipeline.

Figure 1: The MSC HSD-ILDL COM-HPC server module with Intel® Xeon® D-1700 processor.

Key features

- COM-HPC size D module
- Intel Xeon D-1700 processor SoC with up to 10 cores, ~40W to 67W power ranges
- Up to 256GB DDR4, 4x 288pin DIMM, two channels, two DIMMs per channel with ECC capability
- 2x SATA 6 Gbps storage interfaces
- 2x USB 3.2 Gen 2, 2x USB 3.2 Gen 1, 4x USB 2.0
- 16x lanes PCIe Gen 4.0, 16x lanes PCIe Gen 3.0
- Eight configurable Ethernet ports with up to 4x 25GbE connections
- Extended operating temperatures of -40°C to +85°C on select SKUs

Built for 24/7 operation in harsh environments

ATE on an assembly line or vehicle dataloggers often experience prolonged exposure to movement and vibration, whether in the factory on in the field, and reliable technology is a must-have. On-vehicle wireless LAN (WLAN) gateways that provide Wi-Fi on public buses or trains can benefit from the ability to operate for extended periods and through a wide range of temperature conditions. To meet these requirements, select SKUs of Intel-enabled MSC HSD-ILDL modules can operate at extended temperatures in 24/7 use cases, and the soldered-down package provides extra resiliency against shock and vibration. Avnet Embedded also provides various active and passive cooling options for deployments with space or power constraints.

Time-sensitive networking for motion control

In applications that need temporally bounded signal processing—such as robotics or motion control on an assembly line—select SKUs of Intel Xeon D processors support Intel® Time-Coordinated Computing (Intel® TCC).[4] This capability enables key settings in the BIOS and OS that prioritize time-sensitive workloads and task management, making it ideal for systems running real-time hypervisors such as ACRN or RTS and real-time operating systems such as Yocto Linux with PREEMPT_RT or Wind River VxWorks.

Fast inference results for embedded AI applications

For industrial applications with machine vision, Intel Xeon D-1700 processors offer hardware-based acceleration to deliver up to 5.73x improved AI inferencing[3] in a small footprint. The Intel® Deep Learning Boost (VNNI) and Intel® AVX-512 instructions sets drive faster inference processing on the CPU cores. Developers also benefit from the flexibility to convert trained models from practically any framework to further optimize inference on Intel-based platforms with help from the Intel® Distribution of OpenVINO™ toolkit.

The world-class security you've come to expect from Intel[5]

Intel Xeon D-1700 processors provide hardware-enabled security[5] that helps harden embedded platforms, helps reduce attack surface, and helps protect important intellectual property (IP) and test data. Intel® Boot Guard helps prevent unauthorized software and malware takeover of boot blocks to help systems start in a known, trusted state. Intel® Total Memory Encryption (Intel® TME) helps encrypt data in physical memory to prevent memory snooping or vulnerability from DIMM removal. Intel® Software Guard Extensions (Intel® SGX) isolates sensitive data in trusted memory enclaves during runtime.

Supported Intel® Xeon® D-1700 processors for the Avnet Embedded MSC HSD-ILDL COM-HPC module

Processor Number^A		Cores	TDP	DDR Channels	DDR4 1DPC	Integrated Intel® Ethernet	PCIe 4.0 Lanes	High-Speed Input/Output (HSIO) Lanes	Extended Temp	Intel® Time Coordinated Computing
Intel® Xeon® D-1746TER processor	Base	10	67W	3	2667 MHz	100GbE	16	24	Yes	Yes
	SST-PP profile	10	56W							
	SST-BF profile	6 + 4	67W							
Intel® Xeon® D-1735TR processor		8	59W	3	2933 MHz	50GbE	16	24	No	Yes
Intel® Xeon® D-1732TE processor		8	52W	3	2667 MHz	50GbE	16	24	Yes	No
Intel® Xeon® D-1715TER processor		4	50W	3	2667 MHz	50GbE	16	24	Yes	Yes
Intel® Xeon® D-1712TR processor		4	40W	3	2400 MHz	50GbE	16	24	No	Yes

A. Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.

Seamless design integration and simplifying future migrations

The Intel-enabled Avnet Embedded solution meets the requirements of COM-HPC, an open industry standard that defines new high-speed connectors, which can carry PCIe Gen 4.0 traffic and multiple 25GbE connections. System architects get a flexible combination of COM-HPC module and carrier board where the module hosts the CPU and memory and the carrier board hosts device ports and Ethernet connections. Anytime a business needs to upgrade to the next generation of processor, they can swap out the COM-HPC module and leave the carrier board and all peripheral connections intact.

This future-forward design makes it easier to take advantage of the performance gains and new features of the latest CPU generations with minimal impact to peripherals and network configurations. As a result, businesses can quickly deploy and start experiencing the benefits of new technologies as they become available.

Conclusion: Server-class performance in a COM-HPC module for ATE and dataloggers

The MSC HSD-ILDL module gives enterprises a quick path to take advantage of the latest enhancements in the Intel Xeon D-1700 processors. Up to 10 processor cores, high-capacity memory and ECC support, and ruggedness built into a COM-HPC package make this solution a highly flexible fit for ATE, datalogging, and other embedded applications. Not only can the solution meet the demands of performance-hungry and data-heavy workloads, but modules can be deployed into existing infrastructure or support future hardware migration projects with ease.

Learn more

Learn more about the Avnet Embedded MSC HSD-ILDL COM-HPC module at **embedded.avnet.com/product/msc-hsd-ildl**.

Discover the capabilities of the Intel Xeon D-1700 processor at **intel.com/icelake-d**.

About Avnet Embedded

Avnet Embedded builds embedded compute, display and software solutions that meet the demand for innovation and quality from a world-class team of experts.

embedded.avnet.com

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1. "$71,784.6Mn by 2028 Semiconductor Assembly and Testing Services Market Size Driven by Automotive Sector (4.7% CAGR)," globenewswire.com, October 2021. globenewswire.com/en/news-release/2021/10/28/2322943/0/en/71-784-6Mn-by-2028-Semiconductor-Assembly-and-Testing-Services-Market-Size-Driven-by-Automotive-Sector-4-7-CAGR-Impact-of-Coronavirus-Outbreak-and-Global-Analysis-Forecast-by-TheIn.html
2. See [15] at intel.com/processorclaims: Intel® Xeon® D. Results may vary.
3. See [8] at intel.com/processorclaims: Intel® Xeon® D. Results may vary.
4. Not all features are available on all SKUs. Not all features are supported in every operating system.
5. No product or component can be absolutely secure.