



Flash Memory Summit

# How Form Factors Will Help Shape Tomorrow's Data Centric World

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# The Dilemma of Defining The System of Tomorrow – Today

- Typical design point is 2 socket, 1U server
- Configurability is Critical
  - Needed today does not mean needed tomorrow
  - More stranded IOs = Opportunity lost, wasted \$\$\$
  - Ideal scenario: All **precious** IOs are utilized
- New technologies (e.g., FPGAs) increase the challenge





# Challenges to Address



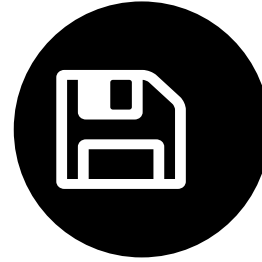
## Need More NVM Sites

less packages/SSD =  
more dies/package =  
lower yield/package



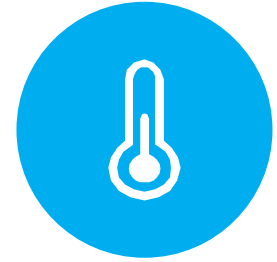
## Support SSDs and MORE

Legacy connectors  
have been SSD only.



## Optimize for NVM

Legacy form factors in  
Enterprise and  
Datacenter based on  
HDDs or client SSDs.

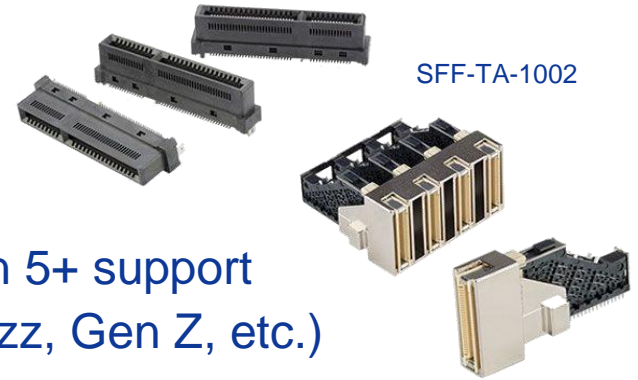


## Thermals and TCO Matter

Legacy SSDs not  
thermally optimized.  
Airflow to CPU restricted.

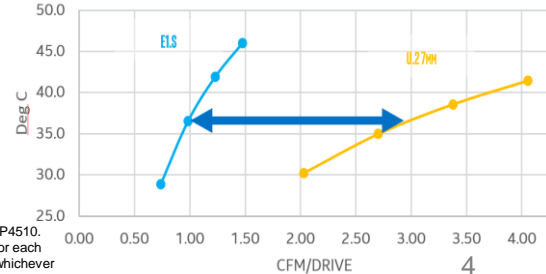
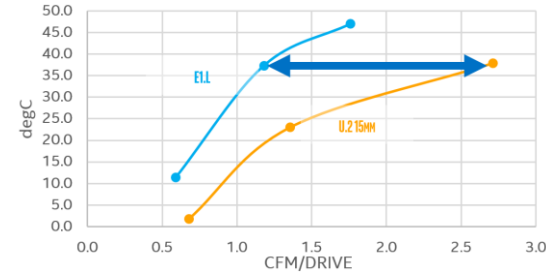


# Enter EDSFF



SFF-TA-1002

- General purpose scalable connector
  - Flexible: Multiple orientations, widths, PCIe\* Gen 5+ support
  - Supports interoperable specs (EDSFF, OCP Mezz, Gen Z, etc.)
- Break free of legacy to optimize for NVM
  - 50-100% increase in media package sites
- Improved thermal efficiency
  - 2-3x less airflow needed
  - Or support higher power devices



<https://www.amphenol-icc.com/product-series/mini-cool-edge-0-60mm.html>

Source – Intel. Comparing airflow required to maintain equivalent temperature of a 4TB U.2 15mm Intel® SSD DC P4500 to a 4TB “1U.L” form factor for Intel® SSD DC P4500. Source – Intel. Comparing airflow required to maintain equivalent temperature of an 8TB U.2 7mm Intel® SSD DC P4500 to a 8TB EDSFF 1U-Short form factor for Intel® SSD DC P4510. Results have been estimated or simulated using internal analysis or architecture simulation or modeling, and provided for informational purposes. Simulation involves three drives for each form factor in a sheet metal representation of a server, 12.5mm pitch for “Ruler” form factor, 1000m elevation, limiting SSD on case temp of 70C or thermal throttling performance, whichever comes first. 5C guard band. Results used as a proxy for airflow anticipated on EDSFF spec compliant “Ruler” form factor Intel® SSD P4510.



# Scalable Family for Different Usages



## E1.L (SFF-TA-1007)

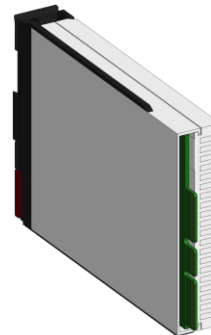
- 318.75 x 38.4 mm
- Supports > 40W
- Up to 48 Standard NAND sites

- Same Protocol: NVMe
- Same Interface: PCIe
- Same Connector: SFF-TA-1002
- Same Pinout and Functions (hot plug, serviceable)
- Different Usages, Same Expectations!



## E1.S (SFF-TA-1006)

- 111.5 x 31.5 mm
- Supports >12W
- Up to 12 Standard NAND sites



## E3 (SFF-TA-1008)

- (104.9/142.2) x 76mm
- Supports up to 70W
- Up to 48 Standard NAND sites



# Build Your Future with EDSFF

- EDSFF is **THE** form factor for the next decade for SSDs
  - Higher power, higher bandwidth, better thermals and better density
- Future proof your next design with the common connector
  - SSDs, NICs, FPGAs, Storage Class Memory, Accelerators, ...
- For more information: <http://www.snia.org/sff/specifications>
  - Connector: SFF-TA-1002: Card Edge multilane protocol agnostic connector
  - E1.S formfactor: SFF-TA-1006: Enterprise and Datacenter 1U Short SSD Form Factor
  - E1.L formfactor: SFF-TA-1007: Enterprise and Datacenter 1U Long SSD Form Factor
  - E3 formfactor: SFF-TA-1008: Enterprise and Datacenter 3" Media Device Form Factor
  - Pin list/other: SFF-TA-1009: Enterprise and Datacenter SSD Pin and Signal Specification