

Open for All.



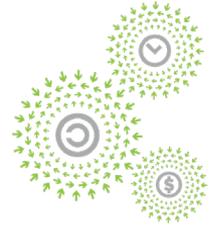
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EDSFF – A Dynamic Family of Form Factors for Data Center SSDs

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EDSFF Family Overview

- Family of form factors and standards for data center NVMe SSDs
- E1.S for scalable & flexible performance storage
- E1.L for high capacity storage (e.g. QLC)
- E3 high performance SSD for 2U server / storage

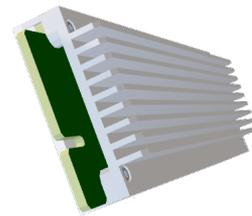
E1.S



5.9mm



9.5mm



15mm



25mm

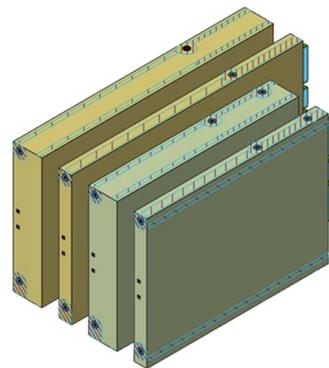
E1.L 9.5mm



E1.L 18mm



E3 v2



What is EDSFF?

- A family of form factors and standards for data center SSDs
- Improved SSD capacity, thermals, power, and scalability
- Flexible options for high density and improved data center TCO (E1.L), scalable performance (E1.S) and mainstream 2U server/storage (E3)
- High-speed multi use connector with robust ecosystem
- Full hotplug support
- Built in LEDs, carrier-less design, enclosures for ESD
- Fully customizable latch (OCP opportunity!) for toolless serviceability
- Common pinout for SSD

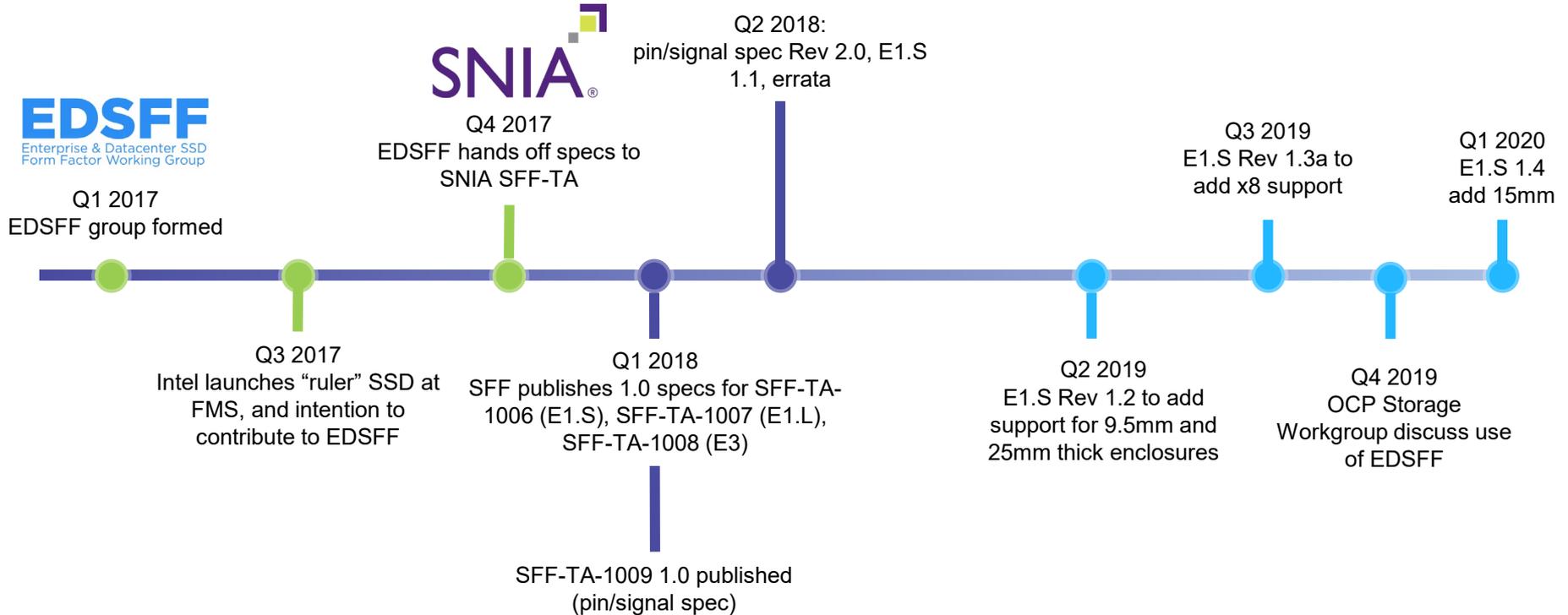


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EDSFF History



Connector Ecosystem



EDSFF

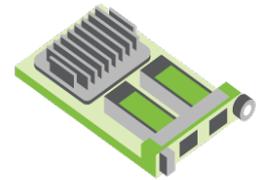
Native NVMe-oF Drive



High Speed Cables

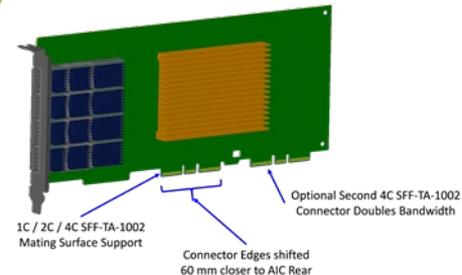


X4
X8
X16



OCP NIC 3.0

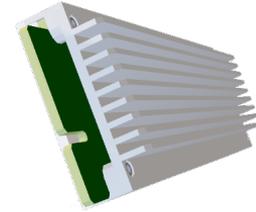
PECFF / SFF-TA-1021



SFF-TA-1002 Connector versions: Vertical (like PCIe CEM), Right-Angle (Like PCIe M.2), Orthogonal, Straddle, Cable. High speed up to 112 GT/s PAM4
SFF-TA-1012 shows pinout differences between EDSFF, OCP, Gen Z, etc.

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

E1.S Thermal Options and Use Cases



Enclosure Parameter	5.9mm Device	Device with Heat Spreader (8.01mm)	Device with Symmetric Enclosure (9.5mm)	Device with Asymmetric Enclosure (15mm)	Device with Asymmetric Enclosure (25mm)
Recommended sustained power (W)	12	16	20	20	25
Enclosure Max Inlet air temperature, 950 m to 3050 m (° C)	35 - (1° C for 175 m of elevation gain)	35 - (1° C for 175 m of elevation gain)	35 - (1° C for 175 m of elevation gain)	35 - (1° C for 175 m of elevation gain)	35 - (1° C for 175 m of elevation gain)
Add in card to add in card pitch (mm)	9	11	13	17	26
Recommended Fan Pressure loss across device (Pascal)	83	52	64	40	21
Airflow, average min per device (CFM). 1 CFM = 1.7 m3/h)	1.41 – (0.01 CFM for every 1° C below 35° C inlet temp)	1.71 – (0.06 CFM for every 1° C below 35° C inlet temp)	2.02 - (0.02 CFM for every 1° C below 35° C inlet temp)	1.5 - (0.02 CFM for every 1° C below 35° C inlet temp)	4.10 - (0.04 CFM for every 1° C below 35° C inlet temp)

Source: SFF-TA-1006 rev 1.4
 Touch point Temperature limit (80 °C)
 Enclosure Max Inlet air temperature, < 950 m (35 °C)



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New – proposed at OCP, E1.S 15mm



- E1.S new thickness at 15mm, up to 25-35W @ 35C, 24x drives in 1U server
- Higher performance than U.2 in smaller form factor
- Scales to PCIe 5.0, 3D NAND and storage class memory (e.g. Intel® Optane™ SSD)
- Performance, power, and thermals for mainstream SSD capacities (4, 8, 16TB) in the next 2-5 years



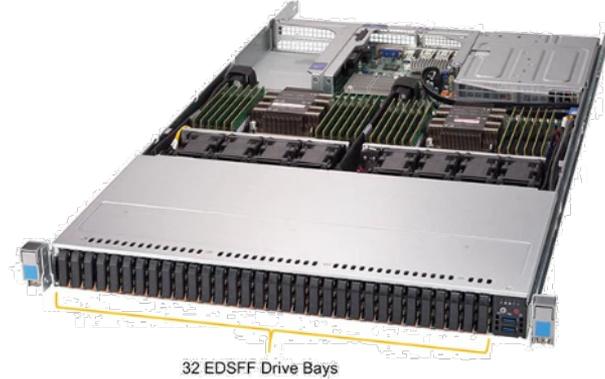
System designs for E1.S



SuperServer SSG-1029P-NES32R

(Angled View – System)

E1.S optimized for IOPS intensive workloads



up to 36 E1.S in 1U for
scalable performance

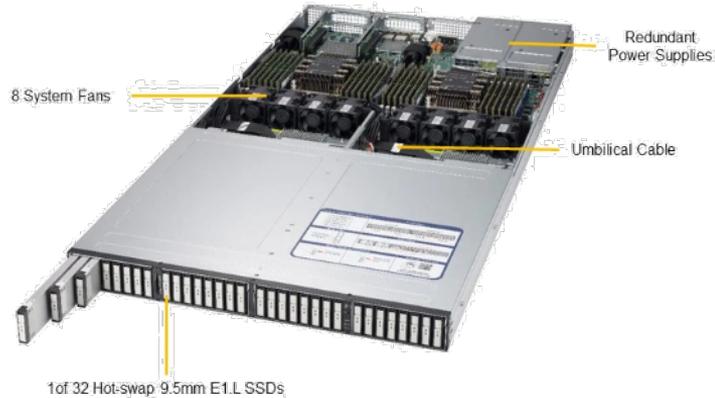


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System designs for E1.L

SuperStorage SSG-1029P-NEL32R

(Angled View – System)



E1.L optimized for lowest TCO on QLC NVMe



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E1.L optimized for TB/rack unit & performance

EDSFF Future

The OCP Cloud NVMe SSD Specification is Built on EDSFF

E1.S

U.2 like performance with better thermals
Hot-Plug & serviceability
Flexible heat sink options for different solutions
Compute/Server Optimized



E1.L

Best TCO for QLC, high performance TLC
Hot-Pluggable & Front Serviceable
9.5mm & 18mm
2x more thermally efficient vs U.2
Cloud Storage Optimized



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Call to Action

- Attend OCP Storage Workgroup! Start building on EDSFF today
- E1.S 15mm by mid 2020
- Join OCP Storage Workgroup <https://www.opencompute.org/wiki/Storage>
- Find more info about Intel EDSFF here
- <https://www.intel.com/content/www/us/en/products/docs/memory-storage/solid-state-drives/edsff-brief.html>
- Find more details about EDSFF at SNIA here
- <https://www.snia.org/forums/ssi/knowledge/formfactors>
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