EDSFF 1 Year In: What Have We Learned?

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Scalable Family for Different Usages

- **E1.1 (SFF-TA-1007)**
  - 318.75 x 38.4 mm
  - Supports > 40W
  - Up to 48 Standard NAND sites

- **E1.5 (SFF-TA-1006)**
  - 111.5 x 31.5 mm
  - Supports >12W
  - Up to 12 Standard NAND sites

- **E3 (SFF-TA-1008)**
  - (114.5/142.4) x /bmm
  - Supports up to 70W
  - Up to 48 Standard NAND sites

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.
Specs: What’s Changed?

E1.L (SFF-TA-1007) Rev 1.1
- 318.75 x 38.4 mm
- Supports > 40W
- X4, x8 interface

- Learnings, errata

- 111.5 x 31.5 mm
- Supports >12W
- X4 interface

- New: 9.5mm enclosure (20W)
- New: 25mm enclosure (25W)
- New: X8 interface for enclosures
- Learnings, errata
Benefits of the Changes

Higher Power Capability for E1.S
- Slower Fan Rate
- Higher Performance (comparable to a U.2)

X8 PCIe Interface on E1.S
- Higher throughput for usages beyond storage

Learning, Errata for dimensions, LEDs, etc.
- More robust interoperability between hosts and devices
Inlet air temp: 35˚C
Board power: ~16.5W (avg)
Cross section & airflow
- Heat spreader: 11 x 35mm / Longitudinal downstream
- Symmetrical: 13 x 35mm / Longitudinal downstream
- Asymmetrical: 26 x 35mm / Longitudinal downstream

Toshiba Memory has the upcoming EDSFF E1.S form factor with asymmetric enclosure at their booth #307, demonstrating higher power/performance, better thermals and hot-pluggability compared to M.2

E1.S with Asymmetric Enclosure is a superior choice for high-density NVMe™ storage applications

Note:
- CFD thermal analysis simulation
- 16.5W with typical parts placement and does not represent any Toshiba Memory product offering.
- SFF-TA-1006 R1.3a airflow/emp and CFM cross section assumptions from Table
- Results are preliminary and subject to change without notice

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E1.S Thermal Analysis

9.5mm Device w/ Symmetric Enclosure
25mm Device w/ Asymmetric Enclosure

Power (W) vs AirFlow (LFM)
Inlet Air Temp: 35°C

- 9.5mm enclosure (20W)
- 25mm enclosure (25W)


- 111.5mm x 31.5mm
- Supports ≥12W
- X4 interface
- Thermal guidelines @35C allows:
  - 9.5mm 2.02CFM for 20W
  - 25mm 4.1CFM for 25W

E1.S w/asymmetric enclosure provides superior cooling and requires less airflow for the same device power levels

Western Digital

Credit: David Wright - WD

- These are simulated results
- Case temps exceed 80°C in these scenarios
- Data is preliminary and subject to change without notice
We Have Made Progress!

**Optimized for Storage**

Intel® SSD D5-P4326
Available Now

Intel® SSD DC P4510
Available 2nd half 2019†

**Optimized for Compute/Server**

Intel® SSD DC P4511
Available 2nd half 2019†

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**The Shape of the Future**

- Intel launches "Ruler" SSD
- "Ruler" SSD inspires EDSFF* standard
- Intel launches industry's first EDSFF* compliant SSDs†
- EDSFF* SSDs proliferate in the industry

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**2017  2018  2019  2020 & beyond**

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†All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps.

*Other names and brands may be claimed as the property of others.
EDSFF is the building block for storage & more

Future proof your system for the connector (SFF-TA-1002)

For more information: [http://www.snia.org/sff/specifications](http://www.snia.org/sff/specifications)

**Connector**: SFF-TA-1002 Rev 1.2: Card Edge multilane protocol agnostic connector
**E1.S form factor**: SFF-TA-1006 Rev 1.3: Enterprise and Datacenter 1U Short SSD Form Factor
**E1.L form factor**: SFF-TA-1007 Rev 1.1: Enterprise and Datacenter 1U Long SSD Form Factor
**E3 form factor**: SFF-TA-1008 Rev 1.0: Enterprise and Datacenter 3” Media Device Form Factor
**Pin list/other**: SFF-TA-1009 Rev 2.0: Enterprise and Datacenter SSD Pin and Signal Specification