

# STORAGE SOLUTIONS

## QUICK REFERENCE GUIDE

Today's market trends are pushing to integrate storage into a unified system, expanding the traditional idea of a storage solution to include switches with storage, data transfer, application and service resources. TE Connectivity (TE) has always been at the forefront of development and market innovation, offering not only storage connectivity products, but a broad range of storage solutions.

TE continues to be engaged in the latest storage interface standards to support the ever evolving market and its continual need for higher bandwidth. With the technical expertise required to deliver superior designs and customer support, TE offers solutions to virtually any storage challenge.

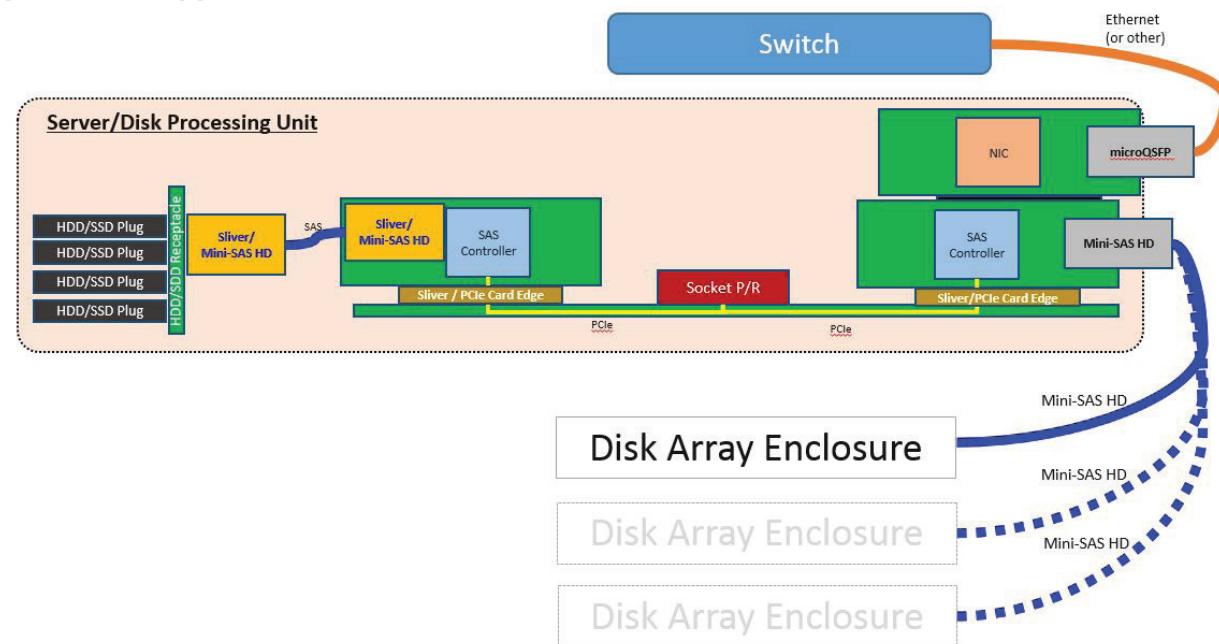
### Product Applications

- Servers
- External storage systems
- HDDs/HDD carriers
- Processor blades
- Mezzanine cards
- Storage racks
- SAS/SATA Host Board Adapter (HBA) interfaces
- Direct-attach storage (DAS)
- JBOD
- RAID

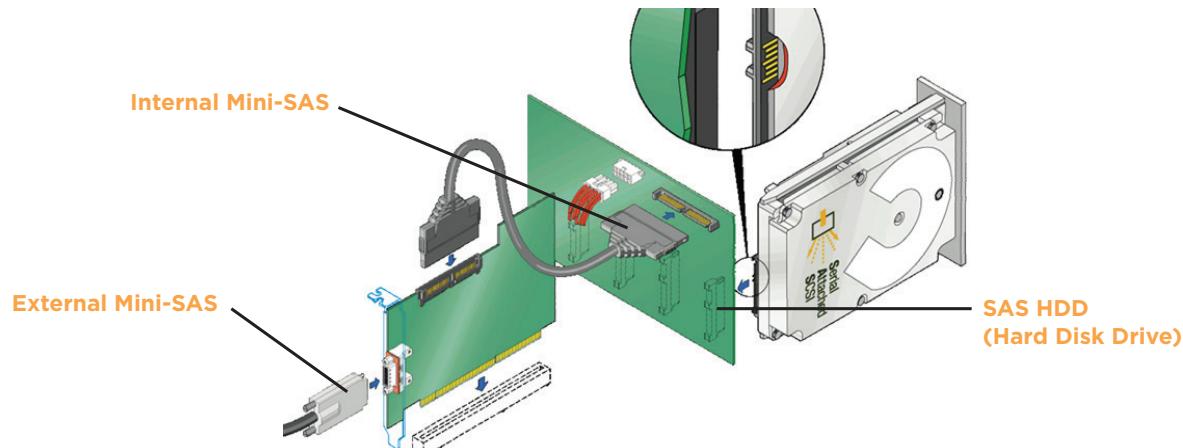
# Storage Solutions

## Quick Reference Guide

### Storage Product Applications



### Meeting Standards with TE Products



| TE Products           | Standards |          |          |          |          |          |          |          |            |         |          |       |       |
|-----------------------|-----------|----------|----------|----------|----------|----------|----------|----------|------------|---------|----------|-------|-------|
|                       | SFF-9073  | SFF-8086 | SFF-8088 | SFF-8482 | SFF-8639 | SFF-8643 | SFF-8644 | SFF-8680 | PCIe Gen 3 | USB 3.0 | SATA 3.0 | SAS 3 | SAS 4 |
| Internal Mini-SAS     | ●         | ●        |          |          |          |          |          |          |            |         |          |       |       |
| External Mini-SAS     |           | ●        | ●        |          |          |          |          |          |            |         |          |       |       |
| SAS 2 Drive Connector |           |          |          | ●        |          |          |          |          |            |         |          |       |       |
| SAS 3 Drive Connector |           |          |          |          | ●        |          |          |          | ●          | ●       |          |       |       |
| Internal Mini-SAS HD  |           |          |          |          |          | ●        |          |          |            |         |          |       |       |
| External Mini-SAS HD  |           |          |          |          |          |          | ●        |          |            |         |          |       |       |
| M.2 NGFF              |           |          |          |          |          |          |          |          | ●          | ●       | ●        |       |       |
| microQSFP             |           |          |          |          |          |          |          |          | ●          | ●       |          |       |       |
| Sliver                |           |          |          |          |          |          |          |          | ●          | ●       | ●        | ●     | ●     |

### Storage Connectors

#### Mini-SAS



- Rated up to 6 Gbps
- 26 position external or 36 position internal receptacles
- High density 0.8mm contact pitch
- Standard and universal key slots available
- Designed to meet SFF-8086 requirements

#### Reference Part Numbers:

**Internal:** 1888019-8

**External:** 2040551-2

#### Mini-SAS HD



- Meets SAS 2.0 (6 Gbps) and 3.0 (12 Gbps) standard
- Vertical and right angle 1x1, 1x2, 1x4 configurations available
- Higher density 0.75mm contact pitch
- Internal and external connectors meet SFF-8643 and SFF-8644 requirements

#### Reference Part Numbers:

**Internal:** 2227595-1

**External:** 2149027-1

#### SAS Drive



- Breadth of product that meets SFF-8482, SFF-8680, and SFF-8639 standards
- Offers 29 and 60 pin configurations in vertical receptacles and plugs; and also SFF-8639 (U.2) right angle receptacles
- *Being designed now - HDSFF, a next generation drive connector*

#### Reference Part Numbers:

**Receptacle:**

1735870-1

2170506-1

2309567-1

**Plug:**

1735610-1

1735183-1

#### Sliver Internal Cabled Interconnects



- Supports a choice of protocols (PCIe, SAS, SATA) for data rates up to 32 Gbps per channel
- 0.6mm pitch SMT connector design
- Flexible mounting and mating arrangements
- Supports present and future bandwidth needs without requiring requalification and redesign

#### Reference Part Numbers:

**Vertical:**

2292096-1

2291316-1

**Right Angle:**

2292055-1

2292069-1

#### M.2 NGFF



- Available in various heights
- 0.5mm pitch with 67 positions
- Designed for both single and double-sided modules
- Available in various keying options for module cards
- Support PCI Express 3.0, USB 3.0 & SATA 3.0

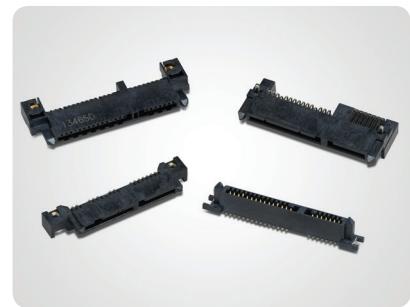
#### Reference Part Numbers:

2199125-X

2199119-X

2199230-X

#### SATA



- Compliant to Serial ATA 3.0 specification with high speed data transfer rate
- Point-to-point link with hot-plugging capability
- Wide selection of heights and orientation
- Alignment-free and slant Insertion SATA solution for easy application

#### Reference Part Numbers:

1735284-X

2129574-1

1735574-2

# Storage Solutions

## Quick Reference Guide

### Storage Cable Assemblies

**Mini-SAS**



- SFF-8088 and SAS 2.0 and SAS 2.1 compliant
- Supports trained and untrained systems
- Up to 6 Gbps data rate
- Universal key and standard key slots
- 24, 26, 28 and 30AWG MADISON CABLE brand bulk cable

**Reference Part Numbers:**

**Internal:** 1888019-8

**External:** 1-2127833-8

**Hybrid:** 2202508-2

**Mini-SAS HD**



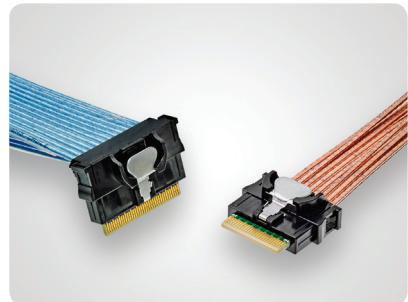
- SFF-8644 and SAS 2.1 compliant
- Broad band design for both 6 Gbps (SAS 2.1) and 12 Gbps (SAS 3.0)
- Improved cable latch design
- Scalable 4x and 8x cable plug configurations
- 24, 26, 28 and 30AWG MADISON CABLE brand bulk cable
- Available in 85 or 100 ohm options

**Reference Part Numbers:**

**Internal:** 2820335-X, 2820330-X

**External:** 2202503-4

**Sliver Internal Cabled Interconnects**



- Supports a choice of protocols (PCIe, SAS, SATA) for data rates up to 32 Gbps per channel
- Available in discrete pair or ribbon laminated 33 AWG cable
- 4x and 8x standard configurations available
- Robust latching for secure connections

**Reference Part Numbers:**

**Straight:**

2820397-1

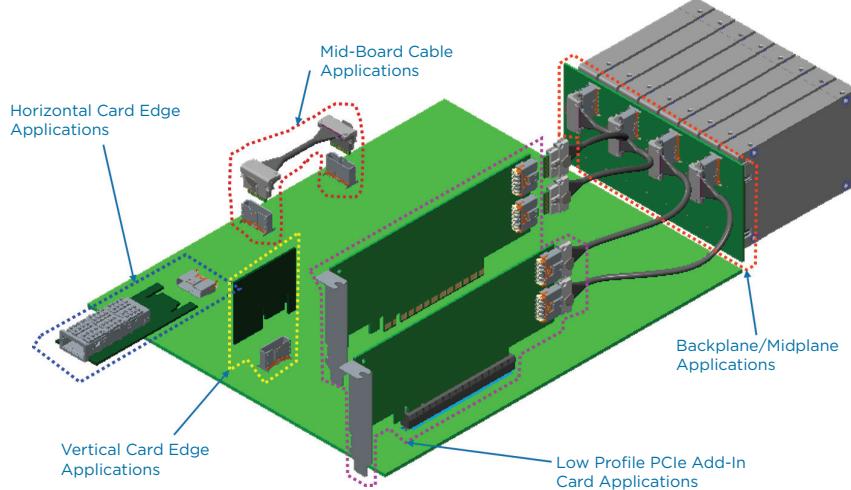
2820396-1

**Right Angle:**

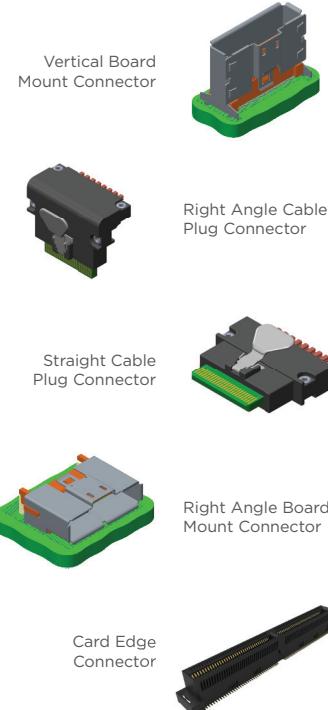
2820399-1

2821385-1

### Sliver Application Design Flexibility



### Sliver Interconnect Options



### Related Products

#### zQSFP+/QSFP+



- Support data rates from 10 Gbps to 56 Gbps per channel. Meets PCIe, Ethernet, Fibre Channel and InfiniBand protocols
- Industry standard interface; drop in replacement for competitive products
- Uses MADISON CABLE brand TURBOTWIN copper cable or InfiniTwist cable

#### Reference Part Numbers:

**Cages:** 1x1: 2-2170705-1      **Connector:** 1551920-2

1x2: 2-2170808-1

**Cable assembly:** 2053638-1

#### microQSFP



- Supports data rates up to 56 Gbps per channel. Meets PCIe, Ethernet, Fibre Channel and InfiniBand protocols
- Enables direct attach copper cables; integrated module thermal solution offers significantly improved thermal performance
- Uses MADISON CABLE brand TURBOTWIN copper cable or InfiniTwist cable

#### Reference Part Numbers:

|                |                |
|----------------|----------------|
| <b>Cages:</b>  | <b>Cables:</b> |
| 1x1: 2297551-1 | 2821236        |
| 1x4: 2297550-1 | 2821783        |
| 2x4: 2286070-1 | 2821779        |

#### LGA 3647 Sockets



- Currently rated at 0.5 Amps with insulation resistance of 500 megohms min. @ 500 VDC
- Two piece design for increased reliability by improving issues with warpage and offering better coplanarity
- Durability rating of up to 30 cycles

#### Reference Part Numbers:

PO: 2-2822979-3

PI: 2-2822979-4

Bolster assembly: 2299804-1

Back plate assembly: 2299805-1

Carrier: 2299806-1

#### LGA 2011 Sockets Also Available:

R3: 2201838-x

R3 Back plate: 2134440

### Board-to-Board Connector Options for Storage

| Connector Family  | Data Rate | Signal Pin Count | Ground Pin Count | Configuration     | Receptacle Part Number | Header Part Number | Additional Configurations                         |
|---|-----------|------------------|------------------|-------------------|------------------------|--------------------|---|
|  STRADA Whisper  | 56G       | 48               | 24               | 4 pair, 6 column  | 2187509-1              | 2187510-1          | Available in 4, 6, 8 and 12 pair configurations   |
|  Z-PACK HM-eZd+  | 25G       | 80               | 40               | 4 pair, 10 column | 2170901-1              | 2170902-1          | -   |
|  IMPACT          | 20G       | 64               | 32               | 4 pair, 8 column  | 2057414-1              | 2057442-2          | Available in 2, 3, 4, 5 and 6 pair configurations |
|  Z-PACK TinMan   | 16G       | 64               | 32               | 4 pair, 8 column  | 1934222-1              | 1934305-1          | Available in 3, 4, 5 and 6 pair configurations    |
|  Z-PACK Slim UHD | 16G       | 48               | 48               | 2 pair, 12 column | 1982738-1              | 2042088-1          | -   |
|  Z-PACK HM-Zd+   | 16G       | 80               | 40               | 4 pair, 10 column | 2065657-1              | 2170330-1          | Available in 2, 3 and 4 pair configurations       |
|  Z-PACK HM-Zd    | 10G       | 80               | 40               | 4 pair, 10 column | 6469001-1              | 6469002-1          | Available in 2, 3 and 4 pair configurations       |

### Frequently Asked Questions

#### What standard and data rate is being used for this design?

Reference table on page 2 that gives the TE product name for each of the SFF documents under the SAS standards.

#### Storage products are commonly referred to as the supporting SFF document number. How do TE products align to those SFF documents?

The diagram on page 2 shows a storage application image and details the TE products used and the SFF documents that govern those products.

#### What is the advantage of using M.2 NGFF connectors over PCIe Mini Card connectors?

The M.2 NGFF connector saves more than 20% printed circuit board (PCB) space when compared to PCIe Mini Card.

#### Does TE offer an internal cabling system?

Yes, Sliver (detailed on pages 4-5) is TE's internal cabling product offering. Sliver is a robust solution that offers multiple options in configuration.

#### Does TE have reports detailing the thermal performance of microQSFP?

Yes, the thermal performance of the microQSFP solution is 30% better than the QSFP28 design. microQSFP information can be found at [www.te.com/microqsfp](http://www.te.com/microqsfp). All test reports and performance data is available - please contact your local TE representative.

#### Where can I find more information on storage products that TE offers?

Information on the products offered in this Quick Reference Guide is available on TE.com at [www.te.com/storagesolutions](http://www.te.com/storagesolutions).

### For More Information

#### TE Technical Support Center

|                   |                       |
|-------------------|-----------------------|
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| Mexico:           | +52 (0) 55-1106-0800  |
| Latin/S. America: | +54 (0) 11-4733-2200  |
| Germany:          | +49 (0) 6251-133-1999 |
| UK:               | +44 (0) 800-267666    |
| France:           | +33 (0) 1-3420-8686   |
| Netherlands:      | +31 (0) 73-6246-999   |
| China:            | +86 (0) 400-820-6015  |

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