

**Design-enhanced Micro SAS connectors now include dual-drive stacked receptacles with an integrated ground plane and a protective pin cover for greater reliability in compact storage applications**

Molex's Micro Serial Attached SCSI (Micro SAS) connectors are the next-generation of 1.8" storage serial I/O solutions designed for compact, high-speed, high-bandwidth SAS applications including Host Bus Adapters and Storage Servers.

Leading Molex's family of Micro SAS plug and receptacle products is the 78495-0001 dual-stack right angle receptacle. This halogen-free, through-hole interconnect stacks two high-speed 1.8" Solid State Drives (SSDs) instead of one, giving storage users twice the drive density of a single right angle equivalent (series 78395). The connector is now shipped with a pin cover that protects all rear terminals from any damage caused by handling or shipment.

A key highlight of this dual-stack connector is the patented Integrated Ground Plane feature. This feature consists of a specially stamped terminal that shields any cross talk between the two adjacent high-speed differential pairs on each side of the plane, improving the connector's signal integrity and electrical speed. Because the Integrated Ground Plane replaces any need for separate grounding pins to be used for the differential high-speed contact pairs, it gives the connector more PCB space-savings, since it terminates beneath the connector only as a single, through-hole soldertail.

One other key feature of the dual-stack connector is its unique overlapping, staggered terminal design within the differential signal pair located on each side of the Integrated Ground Plane in the upper region. This overlapping configuration facilitates stronger coupling within the differential signal pair and induces a higher signal integrity for the connector.

The unique 45-degree terminal bend design of the dual-stack receptacle allows a shorter electrical path between the mating contacts and the PCB, and enables a smoother signal transmission and therefore, higher electrical performance of the connector. Fully compatible with Molex Micro SATA drives and enabling fast data transfer rates of up to 3Gbps, this connector satisfies the SAS 2.0 and the SFF-8486 Specifications\*.

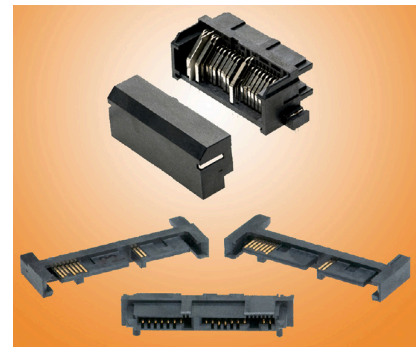
Molex right angle straddle-mount plugs are available with (series 78528) and without (series 78394) drive-holder features to meet low-profile height requirements. Together with the single right angle receptacle (series 78395), these plugs feature a high data transfer speed of 6Gbps and satisfy the SAS 2.0 and SFF-8486 Specifications.

Visit our website at [www.molex.com/product/microsas.html](http://www.molex.com/product/microsas.html) for more information.

\*The SFF-8486 Specification defines the physical interface and general performance requirements for Micro SAS connectors designed for use in high-speed serial interconnect applications including, but not limited to, Solid State Disk (SSD) drives

**Micro Serial Attached SCSI (Micro SAS) Connectors**

- 78394** Plug, Right Angle, Straddle Mount
- 78528** Plug, Right Angle, Straddle Mount, with Drive Holder
- 78395** Receptacle, Right Angle, SMT
- 78495** Receptacle, Dual-stacked, Right Angle, Through Hole with Pin Cover



*Molex's family of high-speed Micro SAS Connectors featuring the Dual-stack Receptacle with Pin Cover*

**FEATURES AND BENEFITS**

**Dual-stack Receptacle**

- Dual-stack receptacle mounts two 1.8" SSD drives, doubling the drive-density of a single SSD device over the same connector footprint
- Integrated ground plane connects the ground pins on the upper and lower deck of the receptacle to the ground on the PCB for high-speed performance while shielding any coupling that may take place between two neighboring high-speed differential pairs of contacts
- Overlapping, staggered terminal design within a differential signal pair facilitates desired stronger coupling between the terminals within a differential pair for improved signal integrity

- 45-degree terminal bend design in the connector housing facilitates smoother signal transmission from mating contacts to the PCB
- Connector pin cover provides full protection to the terminals at the rear of the connector

**All versions**

- Small form factor connectors provide greater PCB real estate savings
- Satisfy SAS 2.0 Specifications and enable fast data rates of up to 6Gbps (3Gbps for 78495)
- 100% backward compatible with Molex Micro Serial ATA; Molex Micro SAS connectors are intermateable with Micro Serial ATA parts as Molex Micro SATA connectors have a middle rib in the Micro SATA housing

- Application of Micro SAS Plug in 1.8" form factor drives (SSD or HDD) host receptacle on backplane can accommodate Molex Micro SAS or Micro SATA drives. Drive can be built with any Molex Micro SAS or Micro SATA Plugs, and are programmable with SAS or SATA firmware
- Crush ribs on plugs provide added PCB retention to straddle-mounted plugs
- Drive-holder housing feature for series 78528 plug supports drive casing in soldertail region
- Keying features and guide rails on connectors prevent mis-mating of parts and ensure smooth entry of plugs to receptacles

## MARKETS AND APPLICATIONS

- 1.8" Storage Drives
  - Solid State Drives (SSD)
  - 1.8" HDD
- Server Storage
  - RAID (Redundant Array of Individual Disks)
  - JBOD ("Just a bunch of disks")
- Adapters
  - HBA (Host Bus Adapters)

## Micro Serial Attached SCSI (Micro SAS) Connectors



**JBOD Storage**



**RAID Storage**

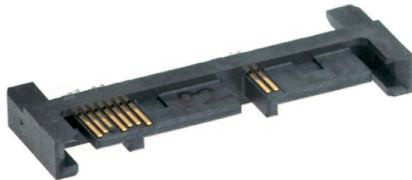


**Solid State Drive**

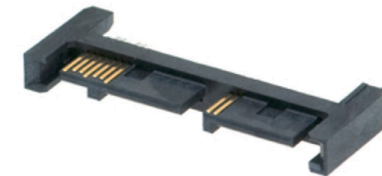


**Server Drives**

## PRODUCT FAMILY



**Micro SAS Plug, Right Angle, Straddle Mount, with Drive Holder (78528)**



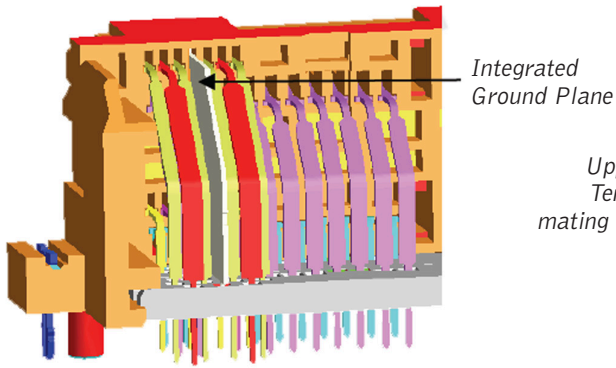
**Micro SAS Plug, Right Angle, Straddle Mount (78394)**



**Micro SAS Receptacle, Through Hole, Right Angle, Dual-stacked with Pin Cover (78495)**

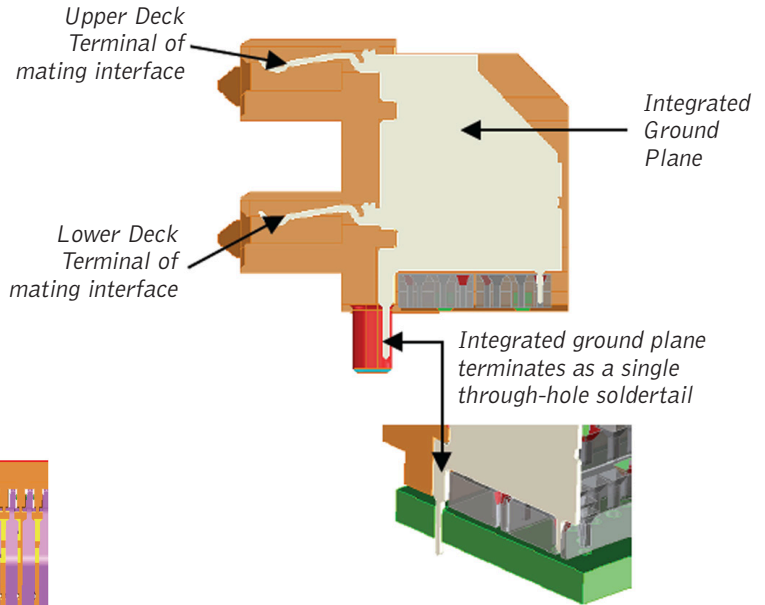


**Micro SAS Receptacle, Right Angle, SMT (78395)**

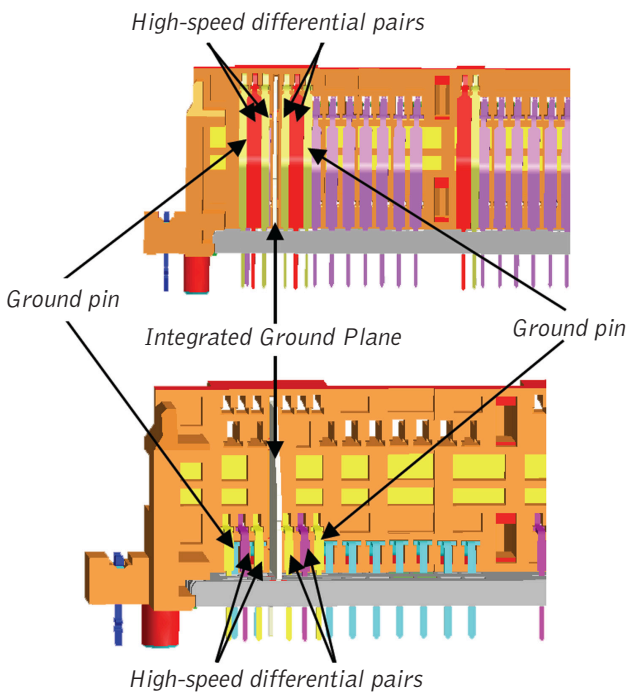


**Molex's patented Integrated Ground Plane feature**

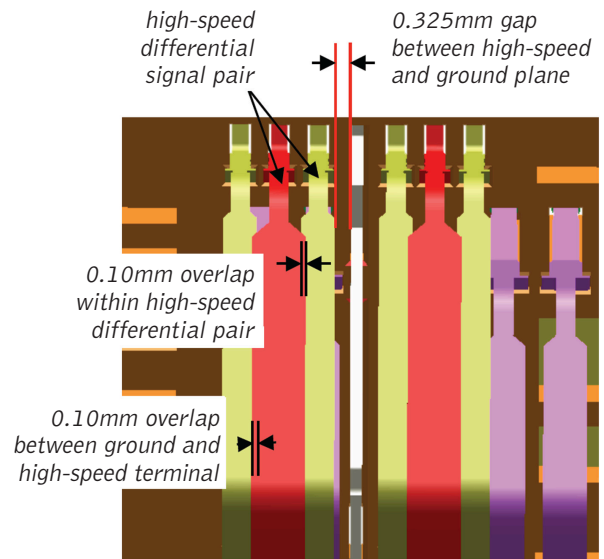
**Micro Serial Attached SCSI (Micro SAS) Connectors**



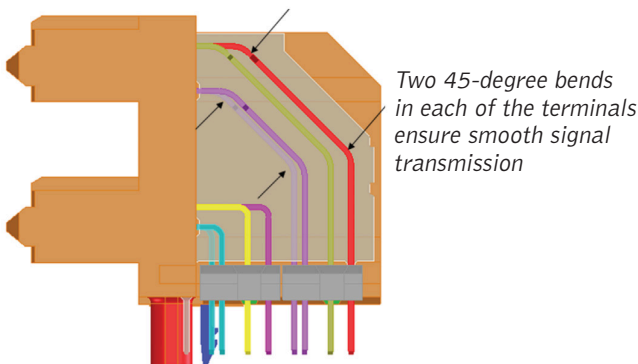
**Cross-section view of the Integrated Ground Plane and its PCB termination**



**Shielded high-speed differential pair contacts of the upper and lower deck terminals of the dual-stack receptacle**



**Molex's overlapping, staggered terminal design induces coupling within the high-speed signal pair resulting in higher signal integrity**



**Two 45-degree bends in the terminal design provide shorter electrical path and smoother electrical transmission**

## SPECIFICATIONS

### Reference Information (Plugs)

Packaging: Tray  
UL File No.: E29179  
CSA File No.: 1699020 (LR19980)  
Mates With  
: 78395, 78495 Receptacles  
Designed In: mm  
RoHS: Yes  
Halogen Free: Yes  
Glow Wire Compliant: No

### Electrical

Voltage (max.): 30V  
Current (max.)  
: 1.5 Amps DC or AC (RMS) at 60 Hz  
Low Level Contact Resistance (min.)  
: 45 milliohms (initial)  
Dielectric Withstanding Voltage  
: 500V AC  
Insulation Resistance (min.)  
: 1000 Megaohms

### Mechanical

Connector Insertion Force (max.)  
: 20 N (to Backplane Receptacles)  
Connector Removal Force (min.)  
: 2.5N (to Backplane Receptacles)  
Terminal Retention Force (min.)  
: 4.45N  
Durability (min.)  
: 500 cycles (Backplane/Blindmate)

### Physical

Housing  
: LCP, Glass-filled, UL 94V-0, Black  
Contact: Copper Alloy  
Plating  
: Contact Area — 0.76 $\mu$ m (30 $\mu$ "  
Gold (Au)  
: Solder Tail Area  
— 2.54 $\mu$ m (100 $\mu$ " Tin (Sn) (78394)  
— 1.91 $\mu$ m (75 $\mu$ " Tin (Sn) (78528)  
: Underplating  
— 1.27 $\mu$ m (50 $\mu$ " Nickel (Ni)  
PCB Thickness: 1.00mm (.039")  
Operating Temperature: 0 to +55°C

## Micro Serial Attached SCSI (Micro SAS) Connectors

## ORDERING INFORMATION

Order No.	Differentiating Features	Product Attribute
78394-0002	<ul style="list-style-type: none"><li>Without special housing feature</li><li>Housing planes are flush on both sides</li></ul>	25 circuit, Right Angle, SMT, Straddle Mount Plugs, Halogen-free, Lead-free
78528-0001	<ul style="list-style-type: none"><li>With drive-casing holder as housing feature at soldertail area of connector</li><li>Housing plane is "stepped" on one side, flush on the other</li></ul>	

## SPECIFICATIONS

### Reference Information (Receptacles)

Packaging: Tray (78395, 78495)

UL File No.  
: E29179 (78395)  
: TBA (78495)

CSA File No.  
: 1699020 (LR19980) (78395)  
: TBA (78495)

Mates With: 78394, 78528 Plugs

Designed In: mm

RoHS: Yes

Halogen Free: Yes

Glow Wire Compliant: No

### Electrical

Voltage (max.): 30V

Current (max.)  
: 1.5 Amps DC or AC (RMS) at 60 Hz

Low Level Contact Resistance (min.)  
: 45 milliohms (initial) (78395)  
: 60 milliohms (initial) (78495)

Dielectric Withstanding Voltage  
: 500V AC

Insulation Resistance (min.)  
: 1000 Megaohms

### Mechanical

Connector Insertion Force (max.)  
: 20 N (to Device Plugs)

Connector Removal Force (min.)  
: 2.5N (to Device Plugs)

Port 1/Forklock Components  
Retention Force (min.): 3.50N

Port 2 Components Retention  
Force (min.): 2.20N

Durability (min.)  
: 500 cycles (Backplane/Blindmate)

### Physical

Housing  
: LCP, Glass-filled, UL 94V-0, Black

Terminal / Forklock  
: Copper Alloy

Plating  
: Contact Area  
— 0.76 $\mu$ m (30 $\mu$ "") Gold (Au)  
: Solder Tail Area  
— 2.54 $\mu$ m (100 $\mu$ "") Tin (Sn)  
: Underplating  
— 1.27 $\mu$ m (50 $\mu$ "") Nickel (Ni)

PCB Thickness (max.)  
: 1.00mm (.039"") (78395-0001)  
: 1.60mm (.063"") (78395-0002)  
: 1.57mm (.062"") (78495-0001)

Operating Temperature: 0 to +55°C

## Micro Serial Attached SCSI (Micro SAS) Connectors

## ORDERING INFORMATION

Order No.	Circuit Size	PCB Thickness	Product Attribute
78395-0001	25	1.00mm (.039")	Right Angle, SMT, Halogen-free, Lead-free
78395-0002		1.60mm (.063")	
78495-0001	50	1.00mm (.039") to 1.57mm (.062")	Dual-stacked, Right Angle, Through hole Halogen-free, Lead free, with Pin Cover