



Mini-SAS HD I/O System Product Presentation



Mini-SAS HD I/O System



Mini-SAS HD I/O System

Mini-SAS HD

- Next generation SAS storage interface
- Addresses channel bandwidth speeds from 6 Gb/s to 12Gb/s (SAS 2.1 & SAS 3.0)
- Enhanced Mini-SAS HD External cable's capable of performing up to 14Gbps
- Provides greater port density vs. mini-SAS
 - Increased linear port-to-port board density
 - 11.00mm port-to-port pitch vs. 19.01 mm
- Compliant to SFF-8643 & 8644 specifications
- Internal & external I/O systems
 - EEPROM communication (external)
 - Side band signaling (internal)
 - 4x and 8x cable configurations
 - Legacy assemblies - Mini-SAS HD to mini-SAS
 - Cage configurations of
 - 16x – 1x4 configuration
 - 8x – 1x2 configuration
 - 4x – 1x1 configuration
- Low profile – PCIe compatible
 - PCIe architecture compatible

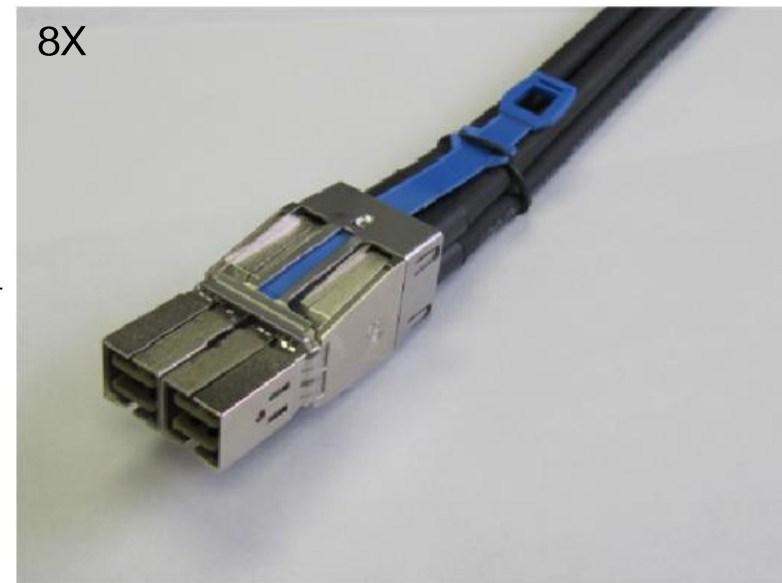


Mini-SAS HD I/O System

External Cable Assemblies

Mini-SAS HD

- External Cable Assemblies
 - 24-30 AWG cable options
 - Passive Copper cables
 - 6G (SAS 2.1) and 12G (SAS 3.0)
 - 4x & 8x double ended configurations
 - Stamped EMI gasket (vs. elastomeric)
 - Reduced force latch design
 - Positive stop feature to prevent mating over-travel
 - Multiple length pull tabs- up to 6 inches (152.4 mm) in length
 - 4x Enhanced External cable assembly up to 14Gbs Bandwidth.
 - Hybrid copper cable assemblies
 - 4x Mini-SAS HD to mini-SAS
 - 8x mini-SAS HD to mini-SAS



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Internal Cable Assemblies

Mini-SAS HD

- Internal Cable Assemblies
 - 30 AWG cable options
 - Passive Copper cables
 - 6G (SAS 2.1) and 12G (SAS 3.0)
 - 4x & 8x double ended configurations
 - Rugged cable latch design
 - All cables carry compliant side band signaling
 - 2 sideband configurations
 - Controller to controller
 - Controller to backplane
 - Difference between configurations is side band signal I/O patterns
 - Hybrid copper cable assemblies
 - 4x Mini-SAS HD to mini-SAS
 - 8x mini-SAS HD to mini-SAS
 - Using bend insensitive cable
 - High speed raw cable
 - 90° bend with no signal degradation
 - Same cable assembly part number for:
 - Straight cable exit
 - R/A cable exit



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External Cable Assemblies

External Cable Assemblies		
SAS 2.1 (6 Gb/s per channel) cable assemblies		
Part Number	Product Description	Signal Pairs
10112041	Mini-SAS HD to mini-SAS HD passive external cable assembly - 4x configuration - SAS2.1 (6Gb/s) compatible	8 pairs
10117771	Mini-SAS HD to mini-SAS passive external cable assembly - SAS2.1 (6Gb/s) compatible - 4x configuration on mini-SAS HD end and universal keying on mini-SAS end	8 pairs
10112359	Mini-SAS HD to mini-SAS HD passive external cable assembly - 8x configuration - SAS2.1 (6Gb/s) compatible	16 pairs
10117947	Mini-SAS HD to mini-SAS passive external cable assembly - SAS2.1 (6Gb/s) compatible - 8x configuration on mini-SAS HD end and universal keying on mini-SAS end	16 pairs
Proposed SAS 3.0 (12 Gb/s per channel) cable assemblies		
Part Number	Product Description	Signal Pairs
10117949	Mini-SAS HD to mini-SAS HD passive external cable assembly - 4x configuration - Proposed SAS3.0 (12Gb/s) compatible	8 Pairs
10117950	Mini-SAS HD to mini-SAS HD passive external cable assembly - 8x configuration - Proposed SAS3.0 (12Gb/s) compatible	16 Pairs
Enhanced (14 Gb/s per channel) cable assemblies		
Part Number	Product Description	Signal Pairs
10120707	Mini-SAS HD to mini-SAS HD passive external cable assembly - 4x configuration - Enhanced (14Gb/s) compatible	8 Pairs



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Internal Cable Assemblies with Std. HD Housing

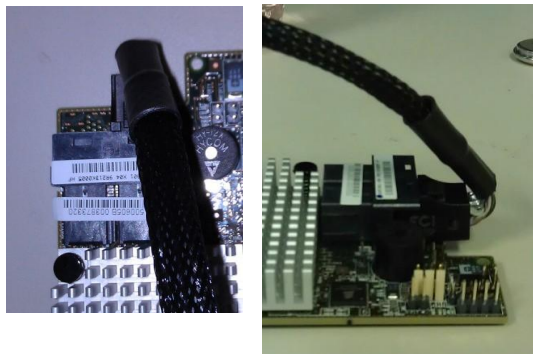
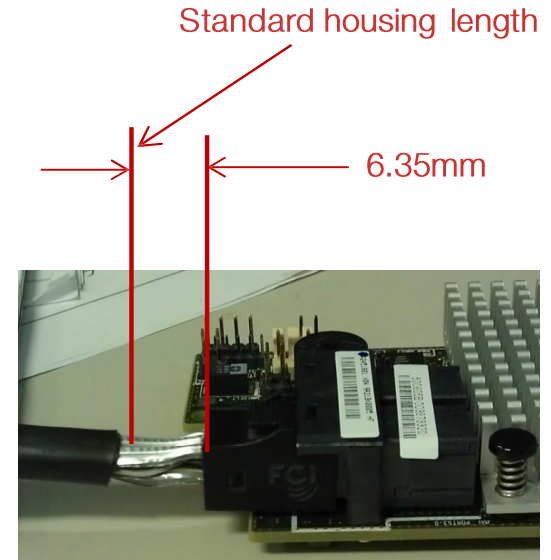
Internal Cable Assemblies - with Standard MiniSAS HD cable Housing		
SAS 2.1 (6 Gb/s per channel) cable assemblies - Controller to Backplane		
Part Number	Product Description	Signal Pairs
10119312	4x Mini-SAS HD to 4x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible	8 pairs
10119577	8x Mini-SAS HD to 8x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible	16 pairs
SAS 3.0 (12 Gb/s per channel) cable assemblies - Controller to Backplane		
Part Number	Product Description	Signal Pairs
10119217	4x Mini-SAS HD to 4x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS3.0 (12Gb/s) compatible	8 pairs
10119576	8x Mini-SAS HD to 8x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS3.0 (12Gb/s) compatible	16 pairs
SAS 2.1 (6 Gb/s per channel) cable assemblies - Controller to Controller		
Part Number	Product Description	Signal Pairs
10120086	4x Mini-SAS HD to 4x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	8 pairs
10120088	8x Mini-SAS HD to 8x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	16 pairs
SAS 3.0 (12 Gb/s per channel) cable assemblies - Controller to Controller		
Part Number	Product Description	Signal Pairs
10120087	4x Mini-SAS HD to 4x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS3.0 (12Gb/s) compatible	8 pairs
10120089	8x Mini-SAS HD to 8x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS3.0 (12Gb/s) compatible	16 pairs



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Internal Mini-SAS HD – Short cable housing

- Short housing needed to allow for tight cable bends/routing
 - Housing is 6.35mm (0.25”) shorter than standard housing
 - Prototypes available – using SLA housing models
 - Production housings & cables available in November, 2012
 - 4X version; can be extended to 8x



Shorter housing allows cable bend to stay within PCB profile



Mini-SAS HD I/O System



Internal Cable Assemblies with Short HD Housing

Internal Cable Assemblies - with Short Mini-SAS HD cable Housing		
SAS 2.1 (6 Gb/s per channel) cable assemblies		
Part Number	Product Description	Signal Pairs
10123417	Short 4x Mini-SAS HD to Short 4x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible	8 Pairs
10127771	Short 8x Mini-SAS HD to Short 8x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible	16 Pairs
10123416	Short 4x Mini-SAS HD to Short 4x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	8 Pairs
10127773	Short 8x Mini-SAS HD to Short 8x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	16 Pairs
Proposed SAS 3.0 (12 Gb/s per channel) cable assemblies		
Part Number	Product Description	Signal Pairs
10122527	Short 4x Mini-SAS HD to Short 4x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS3.0 (12Gb/s) compatible	8 Pairs
10126495	Short 8x Mini-SAS HD to Short 8x Mini-SAS HD passive internal cable assembly - Controller to Backplane - SAS3.0 (12Gb/s) compatible	16 pairs
10122671	Short 4x Mini-SAS HD to Short 4x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS3.0 (12Gb/s) compatible	8 Pairs
10127772	Short 8x Mini-SAS HD to Short 8x Mini-SAS HD passive internal cable assembly - Controller to Controller - SAS3.0 (12Gb/s) compatible	16 pairs



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MSHD to Mini-SAS Internal Cables – with Std. HD Cable Housings

Part Number	Product Description	Signal Pairs
10120612	4x Mini-SAS HD to Mini-SAS 36pin Straight type passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible Right Angle Cable exit on mini-SAS end - Controller to Backplane	8pairs
10123401	4x Mini-SAS HD to Mini-SAS 36pin Horizontal RA type passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible Straight Cable exit on mini-SAS end - Controller to Controller	8pairs
10124108	4x Mini-SAS HD to Mini-SAS 36pin Straight type passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible Right Angle Cable exit on mini-SAS end - Controller to Controller	8pairs
10124110	4x Mini-SAS HD to Mini-SAS 36pin Horizontal RA type passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	8pairs



Mini-SAS HD I/O System



MSHD to Mini-SAS Internal Cables – with Std. HD Cable Housings

Part Number	Product Description	Signal Pairs
10122526	Short 4x Mini-SAS HD to Mini-SAS 36pin Straight type passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s) compatible	8 pairs
Right Angle Cable exit on mini-SAS end - Controller to Backplane		
10123402	Short 4x Mini-SAS HD to Mini-SAS 36pin Horizontal RA type passive internal cable assembly - Controller to Backplane - SAS2.1 (6Gb/s)	8 pairs
Straight Cable exit on mini-SAS end - Controller to Controller		
10124109	Short 4x Mini-SAS HD to Mini-SAS 36pin Straight type passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s) compatible	8 pairs
Right Angle Cable exit on mini-SAS end - Controller to Controller		
10124111	Short 4x Mini-SAS HD to Mini-SAS 36pin Horizontal RA type passive internal cable assembly - Controller to Controller - SAS2.1 (6Gb/s)	8 pairs



Mini-SAS HD I/O System



Board Connectors and Cages / Brackets

- Wafer based board connector construction
 - Well defined manufacturing process
 - Mimics FCI backpanel connector manufacturing
 - FCI has manufactured millions of wafers
 - Board connector the same for internal & external systems
- Metal EMI cages for external systems
 - Each port 360° shielded
 - EON board
 - Board connector
 - Cage
 - Simple application tooling
 - Stamped EMI finger through-chassis termination
 - 1x1, 1x2 and 1x4 configuration offered
- Internal mounting brackets for internal connectors
 - Each port 360° shielded
 - Positive cable assembly mounting
 - 1x4, 1x2 and 1x1 configurations
 - EON Press fit termination
 - Simple “flat rock” tooling
 - Mechanically mounted via screws
 - Board connector the same as used for external systems

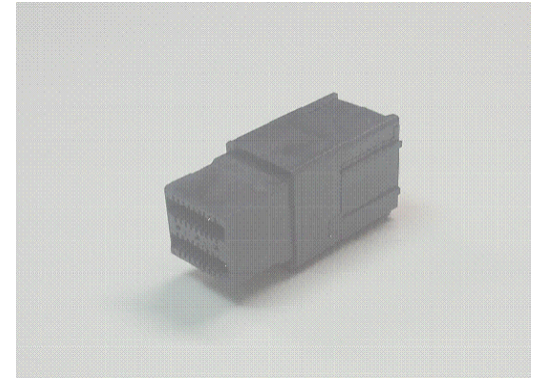


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Board Connector System

- Board connectors and cages / brackets
 - SAS 2.1 vs. SAS 3.0 compliant headers
 - Some market offerings only 6G compliant
 - Fail at 12G performance criteria
 - FCI Design Goal : Singular part number for either application for a given configuration
 - One part number for a given configuration
 - Applies to internal & external connectors
 - Maintain same P/N
 - Whether for a 6G or 12G application
 - Advantages
 - One qualification effort regardless of application
 - Same PCB footprint design for 6G or 12G
 - Reduces present and future system design effort
 - Addresses near term and long term SAS high speed needs / upgrades
 - Reduced part inventory / no additional purchasing effort
 - Applies to both internal and external system designs

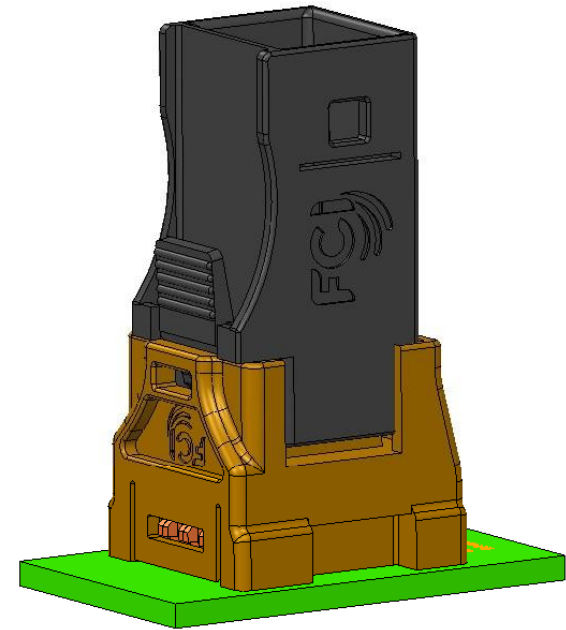


Mini-SAS HD I/O System



MSHD InternalV/T Board Connector

- Wafer based board connector construction
 - Well defined manufacturing process
 - Mimics FCI back panel connector manufacturing
 - FCI has manufactured millions of wafers
 - Board connector for internal
 - EON board termination
 - Board connector
 - Simple application tooling
 - 1x1, 1x2 configuration offered
 - Positive cable assembly mounting
 - 1x2 and 1x1 configurations
 - EON Press fit termination
 - Simple “flat rock” tooling
 - Mechanically mounted via screws
 - Board connector the same as used for internal systems

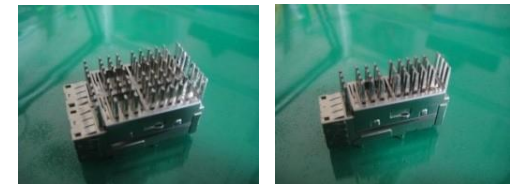


Mini-SAS HD I/O System



MSHD External Board Connector & Cage Assembly with Light Pipe and Heat Sink

- SAS 2.1 vs. SAS 3.0 compliant headers
- IMLA based board connectors
- Metal EMI cages for external systems
- EON board termination
- 1x1, 1x2 and 1x4 configuration offered
- Light Pipe connectors
 - Dual light pipe application
 - LED footprint on the PCB
 - Light pipe indicator location on the front panel
 - Light pipe luminance achieve 400 cd/m² with Dialight green color LED
- Heat Sink connectors
 - Module can get Delta T of 43.3 °C at TIA chip area with 2.129 CFM and 66°C incoming air, and temperature of Plug source can be less than 109.3°C For 1X4 module
 - Module can get Delta T of 13.6 °C at TIA chip area with 2.129 CFM and 66°C incoming air, and temperature of Plug source can be less than 79.6°C For 1X2 module
 - Module can get Delta T of 10.0 °C at TIA chip area with 2.129 CFM and 66°C incoming air, and temperature of Plug source can be less than 76°C For 1X1 module



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External Board Connector System



MSHD External Board Connector and Cage

Part Number	Product Description	Signal Pairs
10112626	Mini-SAS HD 1 X 1 External Assembly (6 & 12 Gb/s per channel)	8 Pairs
10112627	Mini-SAS HD 1 X 2 External Assembly (6 & 12 Gb/s per channel)	16 Pairs
10112628	Mini-SAS HD 1 X 4 External Assembly (6 & 12 Gb/s per channel)	32 Pairs



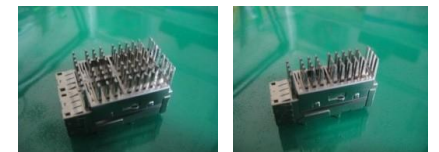
MSHD External Board Connector and Cage Assembly with Light Pipe

Part Number	Product Description	Signal Pairs
10120960	Mini-SAS HD 1 X 1 External Assembly with Light Pipe (6 & 12 Gb/s per channel)	8 Pairs
10120969	Mini-SAS HD 1 X 2 External Assembly with Light Pipe (6 & 12 Gb/s per channel)	16 Pairs
10120728	Mini-SAS HD 1 X 4 External Assembly with Light Pipe (6 & 12 Gb/s per channel)	32 Pairs



MSHD External Board Connector and Cage Assembly with Heat Sink

Part Number	Product Description	Signal Pairs
10112629	Mini-SAS HD 1 X 1 External Assembly with Heat Sink (6 & 12 Gb/s per channel)	8 Pairs
10112630	Mini-SAS HD 1 X 2 External Assembly with Heat Sink (6 & 12 Gb/s per channel)	16 Pairs
10112631	Mini-SAS HD 1 X 4 External Assembly with Heat Sink (6 & 12 Gb/s per channel)	32 Pairs



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Internal Board Connector System



MSHD Internal Right Angel Board Connector and Bracket

Part Number	Product Description	Signal Pairs
10112632	Mini-SAS HD 1 X 1 Internal R/A Assembly (6 & 12 Gb/s per channel)	8 Pairs
10112633	Mini-SAS HD 1 X 2 Internal R/A Assembly (6 & 12 Gb/s per channel)	16 Pairs
10112634	Mini-SAS HD 1 X 4 Internal R/A Assembly (6 & 12 Gb/s per channel)	32 Pairs



MSHD Internal Vertical Board Connector

Part Number	Product Description	Signal Pairs
10120666	Mini-SAS HD 1 X 1 Internal V/T Assembly (6 & 12 Gb/s per channel)	8 Pairs
10120667	Mini-SAS HD 1 X 2 Internal V/T Assembly (6 & 12 Gb/s per channel)	16 Pairs



Mini-SAS HD I/O System

Product Information

Mini-SAS HD Cable assembly & cage & connector documentation

- Documentation available on FCI web site
 - Product data sheet
 - Product Drawings
 - Product specification
 - 3-D mechanical models
 - Application specifications
 - 4x & 8x double ended configurations
 - Stamped EMI gasket (vs. elastomeric)
 - Reduced force latch design
 - Positive stop feature to prevent mating over-travel
 - Multiple length pull tabs- up to 6 inches (152.4 mm) in length
 - 4x Enhanced External cable assembly up to 14Gbs Bandwidth.
 - For more information on the following technical documents, please send your request to FCI Market team
 - Electrical models
 - Electrical test report
 - Capability Matrix
 - Qualification report
 - Web links
 - <http://www.fci.com/en/products/cable-assemblies/mini-sas-hd-cable-assemblies.html>
 - Electrical test boards available upon request
 - Cable assembly, connector & cage qualification samples – Available





THANK YOU

