

Product Specification

Mini-SAS HD & SlimSAS Internal Storage Cables

SAS / SATA / PCIe NVMe Internal Interconnects

Features

- Mini-SAS HD SFF-8643 and SlimSAS SFF-8654 internal cable configurations
- Supports x4 and x8 high-speed storage interconnects
- Straight-through and breakout cable options
- Supports SAS, SATA, and PCIe/NVMe applications depending on cable configuration
- Up to 12Gb/s per lane for SAS 3.0 Mini-SAS HD applications
- SlimSAS supports SAS and PCIe Gen4 high-speed signaling configurations
- Forward breakout options for connecting RAID/HBA controllers to SATA drives
- High-speed shielded differential-pair cable construction
- Positive-latching connectors for secure internal server connections
- Factory assembled and electrically tested

Compliance

- SFF-8643 (Mini-SAS HD)
- SFF-8654 (SlimSAS)
- SFF-9402 Sideband Signaling, where applicable
- SAS / SATA / PCIe Interface Standards, model dependent
- RoHS / REACH

Applications

- Server RAID and HBA Connections
- SAS / SATA Storage Backplanes
- PCIe / NVMe Storage Systems
- Data Center and Enterprise Servers

Description

AICPLIGHT Mini-SAS HD and SlimSAS Internal Storage Cables are designed for high-speed storage interconnections inside servers, storage systems, and data center computing platforms.

The product family includes Mini-SAS HD SFF-8643 and SlimSAS SFF-8654 configurations with x4 and x8 lane options. Straight-through cables provide direct controller-to-backplane connectivity, while breakout cables distribute high-speed interfaces into multiple storage channels.

Mini-SAS HD SFF-8643 cables support SAS 3.0 applications at up to 12Gb/s per lane and can also be used with compatible SAS controllers and SATA storage devices. Forward-breakout SFF-8643-to-SATA cables provide four independent SATA channels for connecting RAID or HBA controllers to SATA HDDs and SSDs.

SlimSAS SFF-8654 provides a compact, high-density internal interface for SAS, SATA, and PCIe/NVMe applications. The x8-to-x8 and x8-to-2×x4 configurations are suitable for controller-to-backplane and lane-breakout connections, while the x4-to-4×SATA configuration provides four SATA channels from a compatible SAS/SATA or Tri-Mode controller.

Protocol support, electrical impedance, sideband signaling, and pin mapping must match the controller and backplane configuration. SAS/SATA and PCIe/NVMe SlimSAS implementations may use different electrical and wiring configurations.

Product Performance Specifications

1、Model Configuration

Parameter	SAS-SFF8643-SFF8643	SAS-SFF8643-4×SATA	SAS-SFF8654-8i-8i	SAS-SFF8654-8i-2×4i	SAS-SFF8654-4i-4×SATA
Product Type	Mini-SAS HD Internal Cable	Mini-SAS HD Forward Breakout Cable	SlimSAS Internal Cable	SlimSAS Breakout Cable	SlimSAS Forward Breakout Cable
Connector A	SFF-8643	SFF-8643	SFF-8654 8i	SFF-8654 8i	SFF-8654 4i
Connector B	SFF-8643	4 × SATA 7-Pin	SFF-8654 8i	2 × SFF-8654 4i	4 × SATA 7-Pin
Lane Configuration	x4 to x4	x4 to 4 × x1	x8 to x8	x8 to 2 × x4	x4 to 4 × x1
Cable Direction	Straight-Through	Forward Breakout	Straight-Through	Breakout	Forward Breakout
Primary Application	SAS RAID/HBA to Backplane	RAID/HBA to SATA Drives	Storage / PCIe-NVMe Backplane	Storage / PCIe-NVMe Lane Breakout	RAID/HBA to SATA Drives
Primary Protocol	SAS 3.0	SATA 3.0 via SAS/SATA Controller	SAS / PCIe NVMe	SAS / PCIe NVMe	SATA 3.0 via Compatible Controller
Number of High-Speed Lanes	4	4	8	8	4

2、Interface and Protocol Performance

Parameter	Mini-SAS HD SFF-8643	SlimSAS SFF-8654
Typical Lane Configuration	x4	x4 / x8
SAS Signaling	Up to 12Gb/s per lane (SAS 3.0)	Supports SAS high-speed signaling in compatible configurations
PCIe Signaling	Interface-dependent	Up to PCIe Gen4, 16 GT/s per lane in 85Ω configurations
SATA Signaling	Via compatible SAS/SATA controller	Via compatible SAS/SATA or Tri-Mode controller
Differential Impedance – SAS/SATA	100Ω	100Ω
Differential Impedance – PCIe	Interface-dependent	85Ω
Sideband Signaling	Supported by applicable wiring	SFF-9402, where applicable

3、Cable Electrical Characteristics

Parameter	Specification
Cable Type	Shielded High-Speed Twinaxial Cable
Signal Conductors	Stranded Copper
High-Speed Pair Gauge	30–32 AWG
Differential Pair Shielding	Aluminum/Polyester Foil
Drain Conductor	Tinned Copper
Cable Impedance	100Ω for SAS/SATA; 85Ω for PCIe configurations
Continuity Test	100% Tested
Short/Open Test	100% Tested
Pin Mapping Verification	100% Tested

4、Connector and Mechanical Characteristics

Parameter	Mini-SAS HD SFF-8643	SlimSAS SFF-8654
Connector Type	Internal Mini-SAS HD	Internal SlimSAS
Connector Retention	Positive Latch	Center / Positive Latch
Connector Pitch	High-Density Mini-SAS Interface	0.6 mm
Minimum Connector Durability	250 Mating Cycles	250 Mating Cycles
Housing Material	High-Temperature Thermoplastic	High-Temperature Thermoplastic

Contact Material	Copper Alloy	Copper Alloy
Contact Plating	Gold over Nickel	Gold over Nickel
Housing Flammability	UL 94V-0	UL 94V-0

5、Model-Specific Performance

Parameter	Specification
SAS-SFF8643-SFF8643	x4 Mini-SAS HD; up to 12Gb/s SAS 3.0 per lane
SAS-SFF8643-4×SATA	Four independent SATA channels; up to 6Gb/s per SATA drive
SAS-SFF8654-8i-8i	x8 SlimSAS; SAS/SATA or PCIe/NVMe configuration depending on controller, backplane, impedance, and wiring
SAS-SFF8654-8i-2×4i	One x8 SlimSAS interface split into two x4 SlimSAS interfaces
SAS-SFF8654-4i-4×SATA	Four independent SATA channels from a compatible SlimSAS SAS/SATA controller

6、Environmental Characteristics

Parameter	Specification
Operating Temperature	0°C to +60°C
Storage Temperature	-40°C to +85°C
Installation Environment	Internal Server / Storage Equipment
Housing Flammability	UL 94V-0
RoHS	Compliant
REACH	Compliant

Handling and Safety Precautions：

- **Power Isolation:** Power off the system before installing or removing the cable.
- **Connector Compatibility:** Verify the connector type, lane configuration, protocol, and pin mapping before installation.
- **Cable Direction:** Forward-breakout cables are directional and should not be used in reverse unless specifically designed for reverse operation.
- **Installation and Removal:** Insert connectors fully and use the connector housing or release latch when disconnecting. Do not pull directly on the cable.
- **Cable Handling:** Avoid excessive bending, twisting, pulling, crushing, or stretching. Maintain the specified minimum bend radius.
- **Breakout Protection:** Avoid uneven tension on breakout branches and protect the fanout section from mechanical stress.
- **Connector Protection:** Keep connector contacts clean, dry, and protected from dust, moisture, and contamination.
- **Modification:** Do not splice, extend, re-pin, or modify the cable, as this may affect signal integrity and compatibility.

Ordering Information

PN	Description
SAS-SFF8643-SFF8643	Mini-SAS HD SFF-8643 to SFF-8643 Internal Cable for Server RAID/HBA-to-Backplane Connections
SAS-SFF8643-4×SATA	Mini-SAS HD SFF-8643 to 4 × SATA 7-Pin Forward Breakout Cable for RAID/HBA-to-SATA Drive Connections
SAS-SFF8654-8i-8i	SlimSAS SFF-8654 8i to SFF-8654 8i Internal Cable for Server Storage and PCIe/NVMe Backplane Connections
SAS-SFF8654-8i-2×4i	SlimSAS SFF-8654 8i to 2 × SFF-8654 4i Internal Breakout Cable for Server Storage and PCIe/NVMe Connections
SAS-SFF8654-4i-4×SATA	SlimSAS SFF-8654 4i to 4 × SATA 7-Pin Forward Breakout Cable for SATA HDD