

To: T10 Technical Committee
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Date: 26 February 2007
Subject: 07-083r0 SAS-2 Mini SAS 4i to SAS 4i cable assemblies with SGPIO

Revision history

Revision 0 (26 January 2007) First revision

Related documents

sas2r08 - Serial Attached SCSI - 2 (SAS-2) revision 8

Overview

The SAS 4i to Mini SAS 4i cable assembly defined in SAS-1.1 has two problems:

- a) the sideband signal connections for the SAS 4i to Mini SAS 4i cable assemblies are "outside the scope of this standard"; and
- b) if the cable assembly is used with the Mini SAS 4i cable receptacle connector on the controller end, then all the SAS lanes are swapped (0->3, 1->2, 2->1, 3->0).

If the sideband signals are wired (vendor-specific) to carry SGPIO (SFF-8485) from Mini SAS 4i controller to SAS 4i backplane, that cable cannot be used from Mini SAS 4i backplane-to SAS 4i controller.

If the sideband signals are wired to carry SGPIO from Mini SAS 4i controller to SAS 4i backplane, the SGPIO bitstream cannot be interpreting coherently:

- a) the SGPIO target on the SAS 4i side assumes the incoming bits in the SGPIO stream match what it thinks are lanes 0 through 3;
- b) the SGPIO initiator on the Mini SAS 4i sends the outgoing bits in the SGPIO stream based on what it thinks are lanes 0 through 3 (but which the SGPIO target thinks are lanes 3 through 0, since that cabel assembly swaps the SAS lane numbers); and
- c) there is no indication to either the SGPIO initiator or the SGPIO target that the cable assembly is swapping the lane numbers. They cannot tell between this cable assembly and a pure Mini SAS 4i to Mini SAS 4i connector.

To fix this problem, two new standard cable assemblies are proposed, with SGPIO sideband signal connectivity also specified:

- a) Mini SAS 4i controller to SAS 4i backplane cable assembly; and
- b) SAS 4i controller to Mini SAS 4i backplane cable assembly.

Suggested changes to SAS-2

5.2 Passive interconnect

5.2.2 SAS connectors and cables

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A SAS internal symmetric cable provides one to four physical links, and may be used as any combination of wide links and narrow links (see 4.1.4) using those physical links.

Figure 1 shows a schematic representation of the SAS internal cable environment attaching a controller to a controller using a SAS internal symmetric cable. Two controllers may also be attached together with a SAS internal symmetric cable. ~~If SAS 4i connectors are used, all four physical links are used (see 5.2.4.1.1).~~

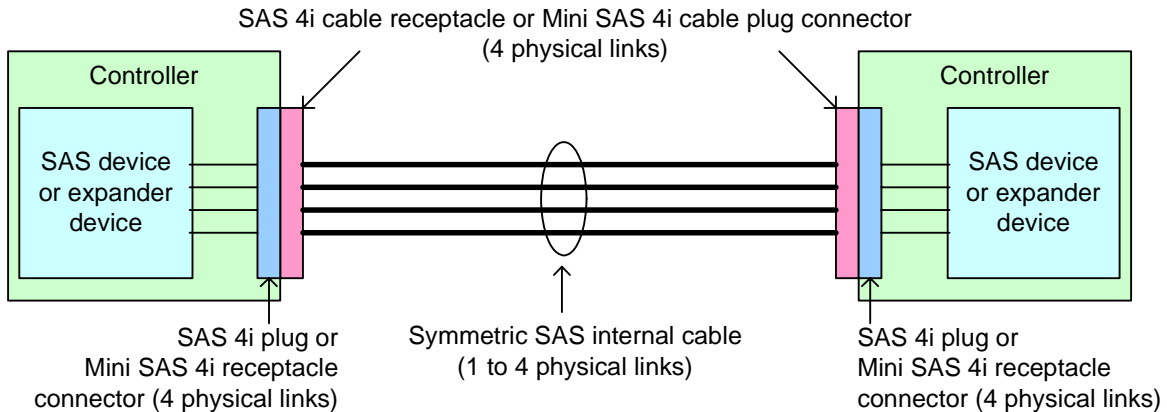


Figure 1 — SAS internal symmetric cable environment - controller to controller

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5.2.4 Cable assemblies

5.2.4.1 SAS internal cable assemblies

5.2.4.1.1 SAS internal symmetric cable assemblies

5.2.4.1.1.1 SAS internal symmetric cable assemblies overview

There are several types of SAS internal symmetric cable assemblies:

- SAS 4i cable receptacle connectors (see 5.2.3.2.2.1) on each end (see 5.2.4.1.1.2);
- Mini SAS 4i cable plug connectors (see 5.2.3.2.3.2) on each end (see 5.2.4.1.1.3); and
- a SAS 4i cable receptacle connector on one end and a Mini SAS 4i cable plug connector on the other end (~~see 5.2.4.1.1.4~~)(~~see 5.2.4.1.1.4, 5.2.4.1.1.5, and 5.2.4.1.1.6~~).

In a SAS internal symmetric cable assembly, the Tx signals on one end shall be connected to Rx signals on the other end (e.g., a Tx + of one connector shall connect to an Rx + of the other connector. SAS internal symmetric cable assemblies should be labeled to indicate how many physical links are included (e.g., 1X, 2X, 3X, and 4X on each connector's housing)

~~With the SAS 4i cable plug connector, the physical link number of the signal depends on the application (e.g., controller-to-controller applications and controller-to-backplane applications differ).~~

~~Although the SAS 4i cable receptacle connector and Mini SAS 4i cable plug connector always support four physical links:~~

- ~~a SAS internal symmetric cable assembly using SAS 4i cable receptacle connectors may support one, two, three, or four physical links when used for controller-to-backplane applications;~~
- ~~a SAS internal symmetric cable assembly using SAS 4i cable receptacle connectors shall support four physical links when used for controller-to-controller applications; and~~
- ~~a SAS internal symmetric cable assembly using Mini SAS 4i cable plug connectors may support one, two, three, or four physical links for either controller-to-backplane or controller-to-controller applications.~~

5.2.4.1.1.2 SAS internal symmetric cable assembly - SAS 4i

Figure 2 shows the SAS internal symmetric cable assembly with SAS 4i cable receptacle connectors at each end.

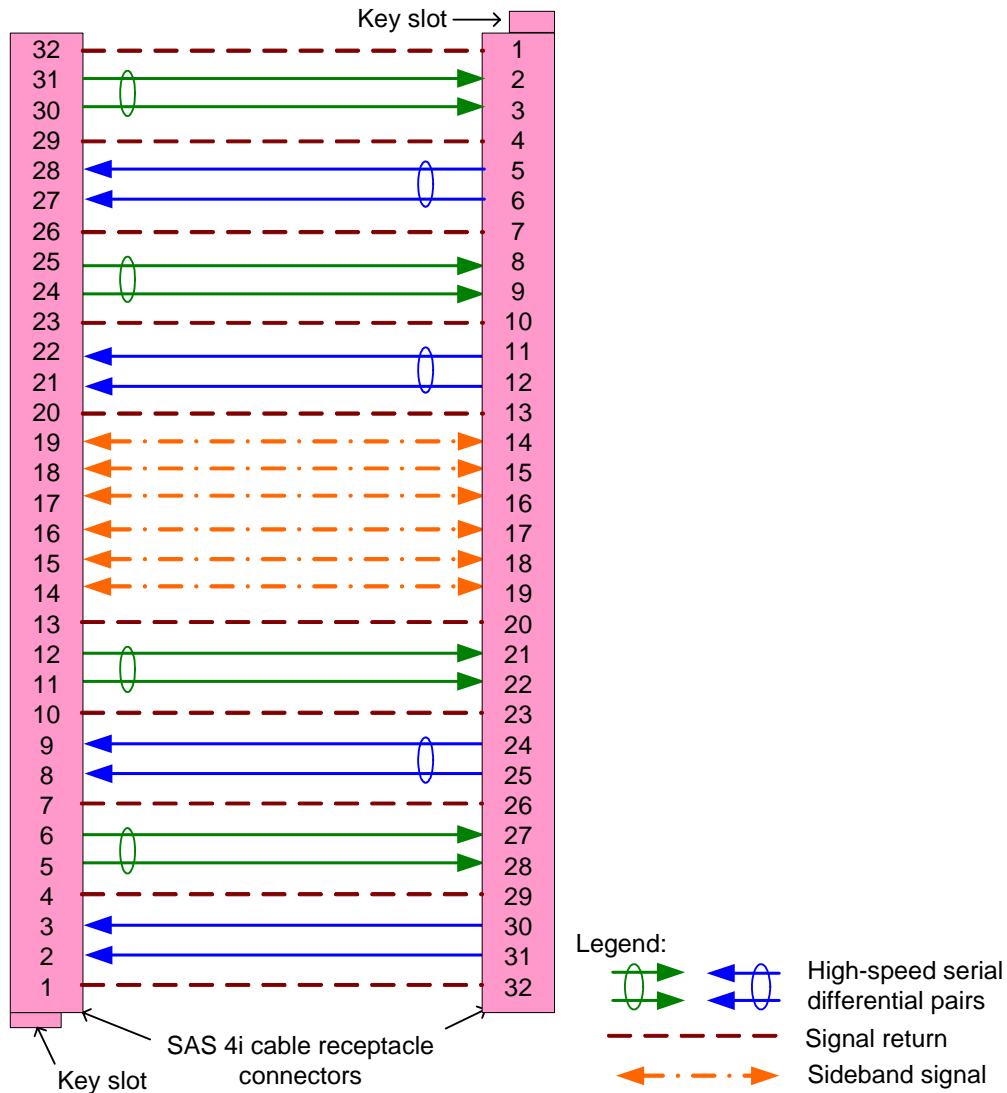


Figure 2 — SAS internal symmetric cable assembly - SAS 4i

In addition to the signal return connections shown in figure 2, the cable assembly may connect one or more of the signal returns together.

For controller-to-backplane applications, the cable assembly may support one to four physical links. SIDEBAND signals on the controller are attached to the corresponding SIDEBAND signals on the backplane (e.g., SIDEBAND0 of the controller is attached to SIDEBAND0 of the backplane).

For controller-to-controller applications, the cable assembly shall support all four physical links and the controllers should use all four physical links, because one controller's physical links 0 and 1 are attached the other controller's physical links 3 and 2, respectively. If both controllers use one or two physical links starting with physical links 0, communication is not possible. If both controllers use physical links 0, 1, and 2, then only communication over physical links 1 and 2 is possible. SIDEBAND signals on one controller are not attached to their corresponding SIDEBAND signals on the other controller (e.g., SIDEBAND0 of one controller is attached to SIDEBAND5 of the other controller).

5.2.4.1.1.3 SAS internal symmetric cable assembly - Mini SAS 4i

Figure 3 shows the SAS internal cable assembly with Mini SAS 4i cable plug connectors at each end.

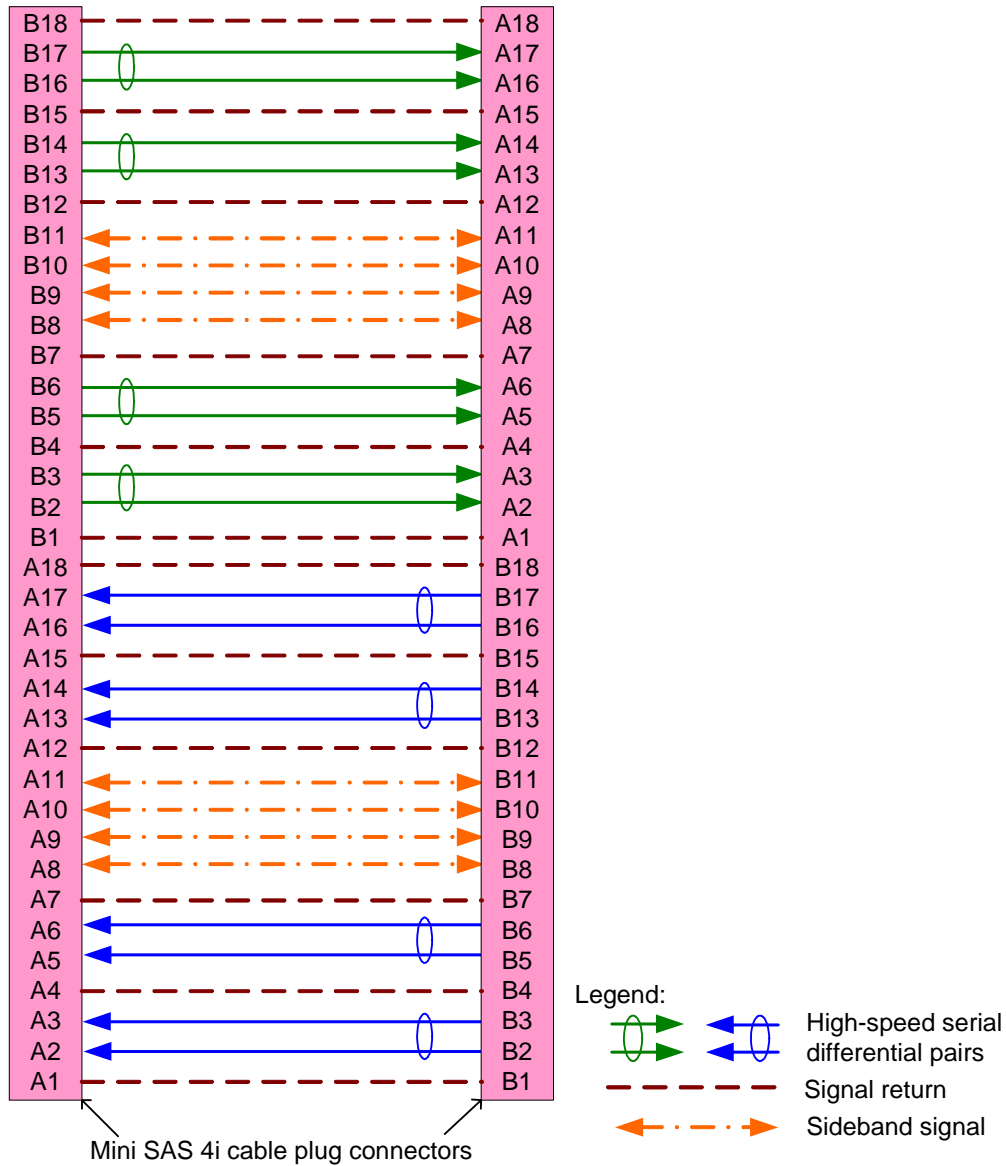


Figure 3 — SAS internal symmetric cable assembly - Mini SAS 4i

In addition to the signal return connections shown in figure 3, the cable assembly may connect one or more of the signal returns together.

The cable assembly may support one to four physical links.

For controller-to-backplane applications, SIDEBAND signals on the controller are attached to the corresponding SIDEBAND signals on the backplane (e.g., SIDEBAND0 of the controller is attached to SIDEBAND0 of the backplane).

For controller-to-controller applications, SIDEBAND signals on one controller are not attached to their corresponding SIDEBAND signals on the other controller (e.g., SIDEBAND0 of one controller is attached to SIDEBAND6 of the other controller).

5.2.4.1.1.4 SAS internal symmetric cable assembly - SAS 4i to Mini SAS 4i [generic](#)

Figure 4 shows the SAS internal symmetric cable assembly with a SAS 4i cable receptacle connector at one end and a Mini SAS 4i cable plug connector at the other end. [Which side is used for the controller is not specified.](#)

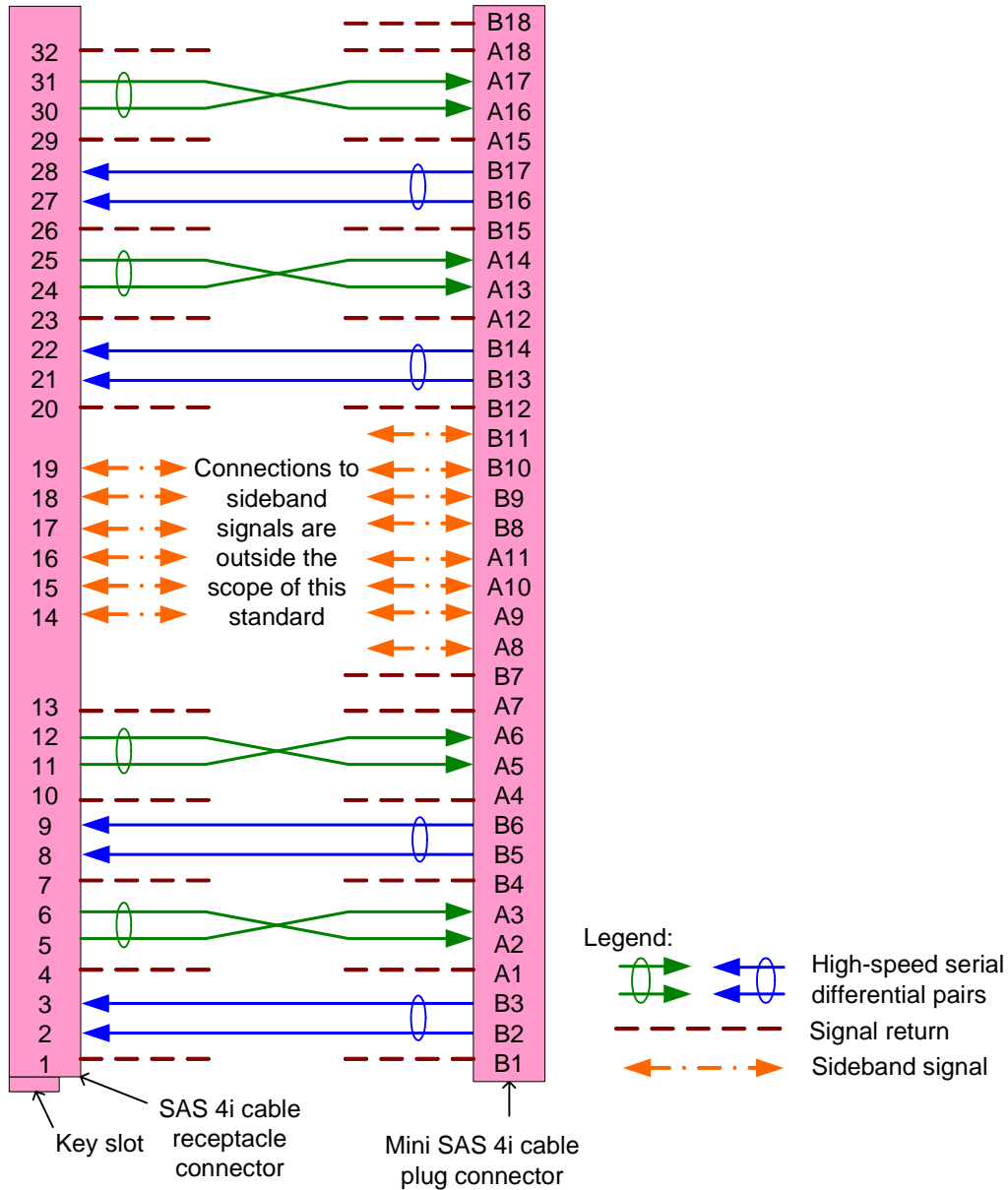


Figure 4 — SAS internal symmetric cable assembly - SAS 4i to Mini SAS 4i [generic](#)

NOTE 1 - The cable assembly needs different SIDEBAND signal routing based on whether the controller or backplane is using the SAS 4i connector.

The cable assembly shall connect each signal return on one end to at least one signal return on the other end. The cable assembly may connect one or more of the signal returns together.

For controller-to-backplane applications with the SAS 4i cable receptacle connector on the controller end, the cable assembly may support one to four physical links.

For controller-to-controller applications, the cable assembly may support one to four physical links.

For controller-to-backplane applications with the Mini SAS 4i cable receptacle connector on the controller end, the cable assembly shall support all four physical links and the controller should use all four physical links,

because the controller's physical links 0, 1, 2, and 3 are attached to the backplane's physical links 3, 2, 1, and 0, respectively. If both controllers use one or two physical links starting with physical links 0, communication is not possible. If both controllers use physical links 0, 1, and 2, then only communication over physical links 1 and 2 is possible.

5.2.4.1.1.5 SAS internal symmetric cable assembly - SAS 4i controller to Mini SAS 4i backplane with SGPIO

Figure 4 shows the SAS internal symmetric cable assembly with a SAS 4i cable receptacle connector at the controller end and a Mini SAS 4i cable plug connector at the backplane end, with sidebands connected to support SGPIO (see SFF-8485).

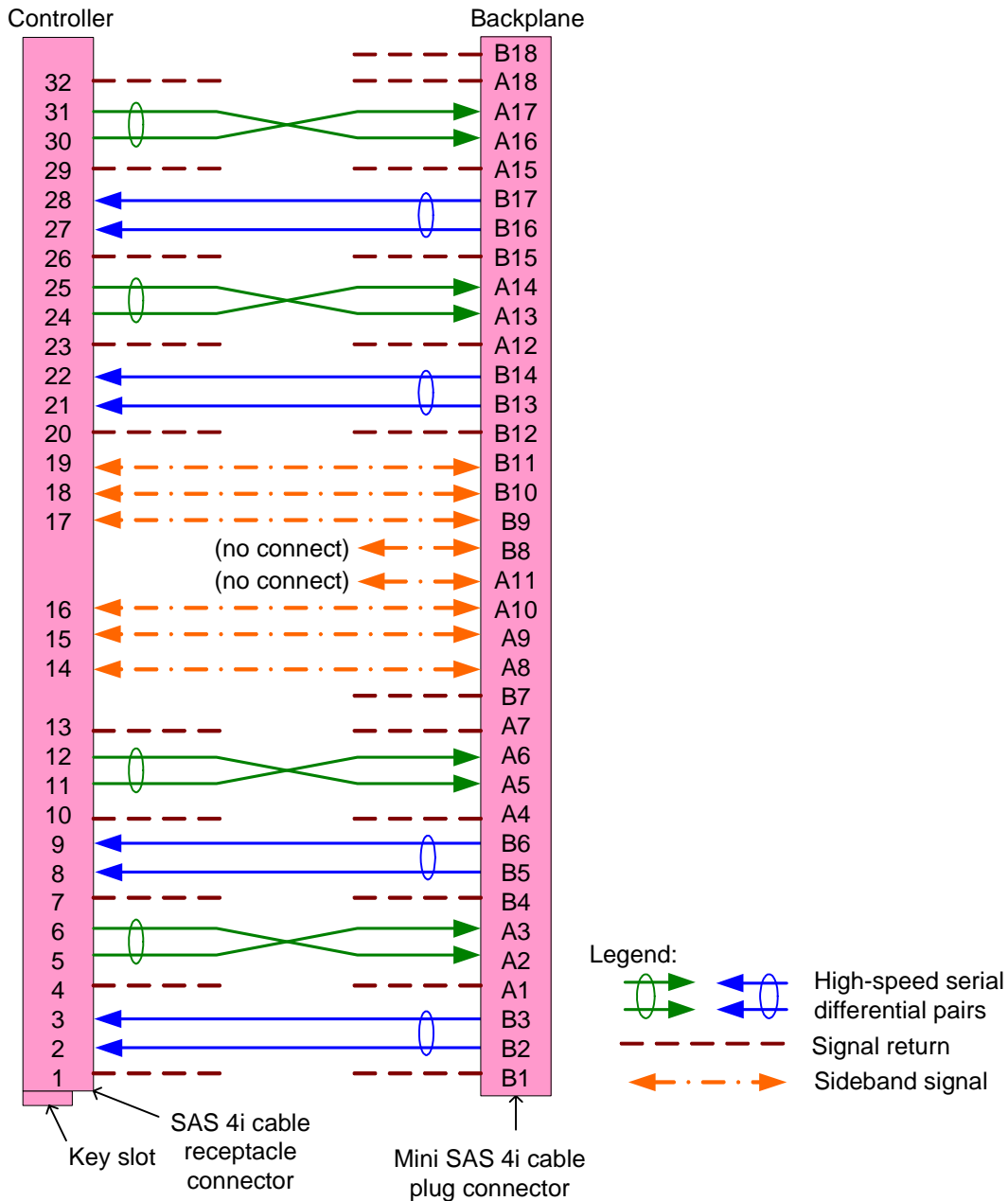


Figure 5 — SAS internal symmetric cable assembly - SAS 4i controller to Mini SAS 4i backplane with SGPIO

The cable assembly shall connect each signal return on one end to at least one signal return on the other end. The cable assembly may connect one or more of the signal returns together.

The cable assembly may support one to four physical links.

5.2.4.1.1.6 SAS internal symmetric cable assembly - Mini SAS 4i controller to SAS 4i backplane with SGPIO

Figure 4 shows the SAS internal symmetric cable assembly with a Mini SAS 4i cable receptacle connector at the controller end and a SAS 4i cable plug connector at the backplane end, with sidebands connected to support SGPIO (see SFF-8485).

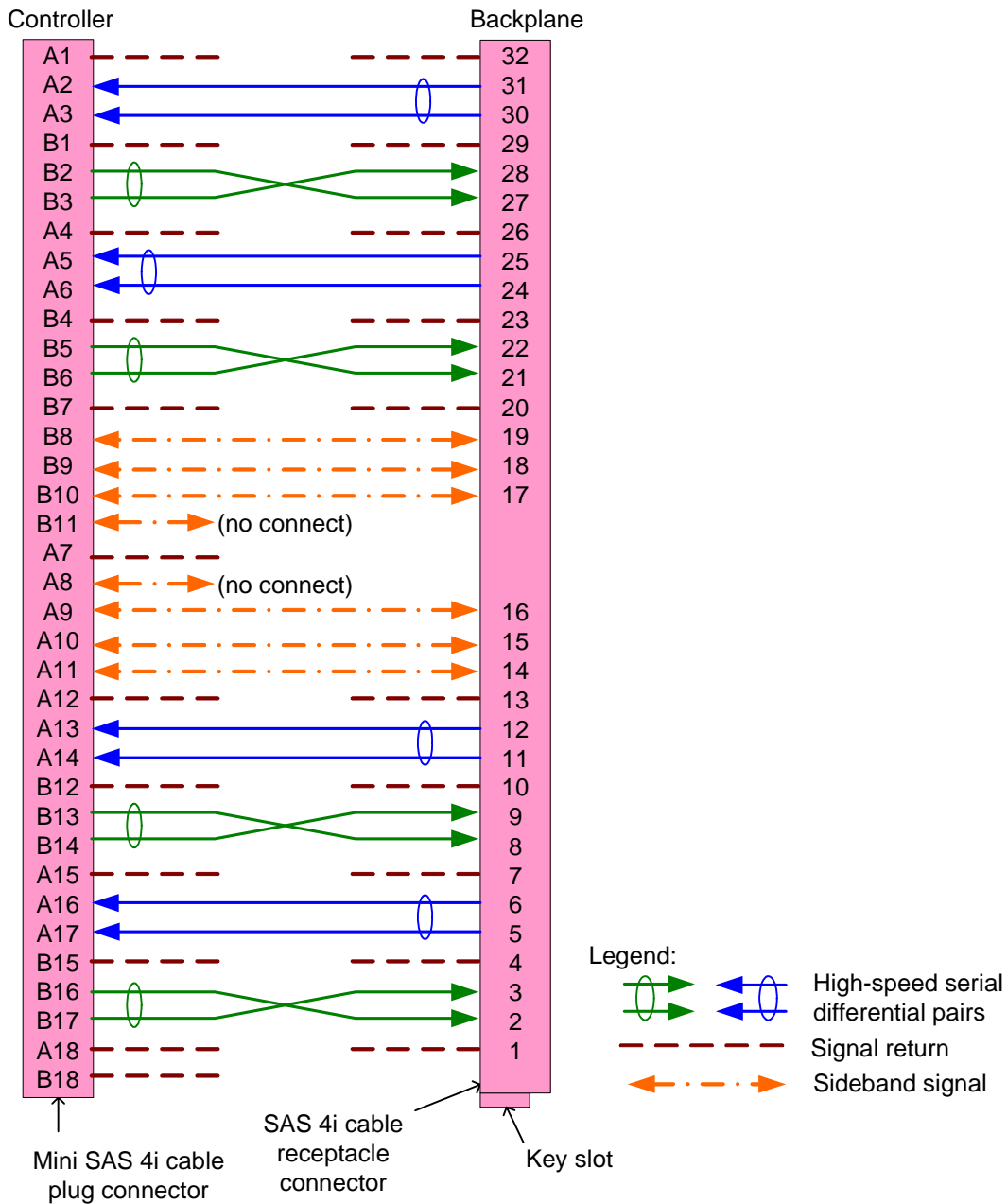


Figure 6 — SAS internal symmetric cable assembly - Mini SAS 4i controller to SAS 4i backplane with SGPIO

The cable assembly shall connect each signal return on one end to at least one signal return on the other end. The cable assembly may connect one or more of the signal returns together.

The cable assembly may support one to four physical links.