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**SFF-9400**

Reference Guide for

**Universal 4/8X Pinouts**

Rev 1.0

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Secretariat: SFF TA TWG

**Abstract:** This specification outlines a set of connector pin signal definitions for an internal cable interface. The definitions are not functionally compatible but do prevent physical damage. Possible applications include, but are not limited to, SAS-3 and SAS-4.

This specification provides a common reference for systems manufacturers, system integrators, and suppliers.

This specification is made available for public review, and written comments are solicited from readers. Comments received by the members will be considered for inclusion in future revisions of this specification.

The description of a connector in this specification does not assure that the specific component is actually available from connector suppliers. If such a connector is supplied it must comply with this specification to achieve interoperability between suppliers.

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**Change History**

Rev 0.2

- No change history information available before this release

Rev 1.0 (July 18, 2018)

- Upgraded to SNIA template format
- Changed header from "Reference Guide" to "Published"
- Added "Reference" watermark
- Removed Section 1.1 Application Specific Criteria
- Added references
- Minor editorial changes

## Foreword

The development work on this specification was done by the SNIA SFF TWG, an industry group. Since its formation as the SFF Committee in August 1990, the membership has included a mix of companies which are leaders across the industry.

When 2 1/2" diameter disk drives were introduced, there was no commonality on external dimensions e.g. physical size, mounting locations, connector type, connector location, between vendors. The SFF Committee provided a forum for system integrators and vendors to define the form factor of disk drives.

During their definition, other activities were suggested because participants in SFF faced more challenges than the form factors. In November 1992, the charter was expanded to address any issues of general interest and concern to the storage industry. The SFF Committee became a forum for resolving industry issues that are either not addressed by the standards process or need an immediate solution.

In July 2016, the SFF Committee transitioned to SNIA (Storage Networking Industry Association), as a TA (Technology Affiliate) TWG (Technical Work Group).

Industry consensus is not a requirement to publish a specification because it is recognized that in an emerging product area, there is room for more than one approach. By making the documentation on competing proposals available, an integrator can examine the alternatives available and select the product that is felt to be most suitable.

SFF meets during the T10 (see [www.t10.org](http://www.t10.org)) and T11 (see [www.t11.org](http://www.t11.org)) weeks, and SSWGs (Specific Subject Working Groups) are held at the convenience of the participants.

Many of the specifications developed by SFF have either been incorporated into standards or adopted as standards by ANSI, EIA, JEDEC and SAE.

For those who wish to participate in the activities of the SFF TWG, the sign-up for membership can be found at:

<http://www.snia.org/sff/join>

The complete list of SFF Specifications which have been completed or are currently being worked on by the SFF Committee can be found at:

<http://www.snia.org/sff/specifications>

Suggestions for improvement of this specification will be welcome, they should be submitted to:

<http://www.snia.org/feedback>

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## 1. Scope

This reference guide outlines a set of connector pin signal definitions for a two-row internal cable connector interface. The definitions are not functionally compatible but do prevent physical damage when two different pinout options are mated. Possible applications include, but are not limited to, SAS-3 and SAS-4. The intent is to facilitate greater flexibility and increased usage.

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Suggestions for revisions should be directed to <http://www.snia.org/feedback/>.

## 2. References

### 2.1 Industry Documents

- INCITS 519 Serial Attached SCSI 3 (SAS-3)
- INCITS 534 Serial Attached SCSI 4 (SAS-4)

### 2.2 Sources

There are several projects active within the SFF TWG. The complete list of specifications which have been completed or are still being worked on is contained in the document SFF-8000 which can be found at <http://www.snia.org/sff/specifications>.

Copies of ANSI standards may be purchased from the InterNational Committee for Information Technology Standards (<http://www.techstreet.com/incitsgate.tmp1>).

### 2.3 Conventions

The dimensioning conventions are described in ANSI-Y14.5M, Geometric Dimensioning and Tolerancing. All dimensions are in millimeters, which are the controlling dimensional units (if inches are supplied, they are for guidance only).

The ISO convention of numbering is used i.e., the thousands and higher multiples are separated by a space and a period is used as the decimal point. This is equivalent to the English/American convention of a comma and a period.

American	French	ISO
0.6	0,6	0.6
1,000	1 000	1 000
1,323,462.9	1 323 462,9	1 323 462.9

### 2.4 Definitions

**GND:** Signal return pin sometimes referred to as a ground

**HS:** High speed differential pair signal pin

**Optional:** This term describes features which are not required by the SFF Specification. However, if any feature defined by the SFF Specification is implemented, it shall be done in the same way as defined by the Specification. Describing a feature as optional in the text is done to assist the reader. If there is a conflict between text and tables on a feature described as optional, the table shall be accepted as being correct.

**SB:** Sideband signal pin

**Vendor Specific:** This term is used the signal on a connector pin and its actual function is determined by each vendor and not reserved for future standardization.

### 3. General Description

Both 4X and 8X pinouts include a combination of high speed differential pairs and vendor specific signals. Figure 3-1 and Figure 3-2 illustrate the location of vendor specific pins for 4X and 8X connector pinouts respectively. Each vendor specific block consists of ten pins.

R	G	H	H	G	H	H	G	VENDOR										G	H	H	G	H	H	G	R
S	N	S	S	N	S	S	N	SPECIFIC										N	S	S	N	S	S	N	S
V	D			D			D											D			D			D	V

FIGURE 3-1: LOCATION OF VENDOR SPECIFIC PINS IN A 4X PINOUT

G	H	H	G	H	H	G	VENDOR										G	H	H	G	H	H	G	H	H	G	
N	S	S	N	S	S	N	SPECIFIC										N	S	S	N	S	S	N	S	S	N	S
D			D			D											D			D			D			D	

FIGURE 3-2: LOCATION OF VENDOR SPECIFIC PINS IN 8X PINOUT

#### 3.1 Type 1 4X Pinout

The Type 1 4X Pinout assigns all vendor specific pins as discrete sideband signals as shown in Figure 3-3.

R	G	H	H	G	H	H	G	S	S	S	S	S	G	H	H	G	H	H	G	R
S	N	S	S	N	S	S	N	B	B	B	B	B	N	S	S	N	S	S	N	S
V	D			D			D						D			D			D	V

FIGURE 3-3: TYPE 1 4X PINOUT

#### 3.2 Type 2 4X Pinout

The Type 2 4X Pinout assigns seven vendor specific pins as discrete sideband signals and three for an additional high-speed differential pair as shown in Figure 3-4.

R	G	H	H	G	H	H	G	H	H	G	S	S	G	H	H	G	H	H	G	R
S	N	S	S	N	S	S	N	S	S	N	B	B	N	S	S	N	S	S	N	S
V	D			D			D						D			D			D	V

FIGURE 3-4: TYPE 2 4X PINOUT

3.3 Type 3 4X Pinout

The Type 3 4X Pinout assigns all vendor specific pins for high-speed differential pairs as shown in Figure 3-5.

R S V	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	R S V
R S V	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	R S V

FIGURE 3-5: TYPE 3 4X PINOUT

3.4 Type 1 8X Pinout

The Type 1 8X Pinout assigns all vendor specific pins as discrete sideband signals as shown in Figure 3-6.

G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	S B	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	R S V	R S V	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	S B	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D			
G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	S B	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	R S V	R S V	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	S B	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D

FIGURE 3-6: TYPE 1 8X PINOUT

3.5 Type 2 8X Pinout

The Type 2 8X Pinout assigns fourteen vendor specific pins as discrete sideband signals and two additional high-speed differential pairs as shown in Figure 3-7.

G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	R S V	R S V	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D
G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	R S V	R S V	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	S B	S B	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D

FIGURE 3-7: TYPE 2 8X PINOUT

3.6 Type 3 8X Pinout

The Type 3 8X Pinout assigns all vendor specific pins for high-speed differential pairs as shown in Figure 3-8.

G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D
G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D	H S	H S	G N D

FIGURE 3-8: TYPE 3 8X PINOUT