Cables and Connector Variants Based on SFF-TA-1002

Rev 0.8.3 January 6, 2020

SECRETARIAT: SFF TA TWG

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The description of the connector in this specification does not assure that the specific component is available from connector suppliers. If such a connector is supplied, it should comply with this specification to achieve interoperability between suppliers. This specification originates from the Gen Z Consortium and supersedes their prior documents.

ABSTRACT: This specification defines cables and connector variants based on the SFF-TA-1002 connector system. In addition to cables, this specification defines a vertical 280 pin variation and a 12V and 48V high power segment for 4C connectors.

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Commented [NJ1]: Added origination comment
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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.

For those who wish to participate in the activities of the SFF TWG, the signup for membership can be found at
http://www.snia.org/sff/join.

Revision History

Rev 0.8.1 December 2, 2019:
- Initial Draft

Rev 0.8.2 December 6, 2019:
- Moved 4C-HP to appendix

Rev 0.8.3 January 6, 2020:
- added origination note
1. Scope
2. References and Conventions
3. Keywords, Acronyms, and Definitions
4. General Description
5. Cable Requirements
6. 4C-HP Connector Requirements
7. 280 Pin Vertical Connector
8. Appendix A. PCB Footprints
9. Appendix B. Media Bay Example

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scope</td>
<td>6</td>
</tr>
<tr>
<td>2. References and Conventions</td>
<td>6</td>
</tr>
<tr>
<td>2.1 Industry Documents</td>
<td>6</td>
</tr>
<tr>
<td>2.2 Sources</td>
<td>6</td>
</tr>
<tr>
<td>2.3 Conventions</td>
<td>7</td>
</tr>
<tr>
<td>3. Keywords, Acronyms, and Definitions</td>
<td>8</td>
</tr>
<tr>
<td>3.1 Keywords</td>
<td>8</td>
</tr>
<tr>
<td>3.2 Acronyms and Abbreviations</td>
<td>8</td>
</tr>
<tr>
<td>3.3 Definitions</td>
<td>9</td>
</tr>
<tr>
<td>4. General Description</td>
<td>11</td>
</tr>
<tr>
<td>4.1 Interoperability</td>
<td>11</td>
</tr>
<tr>
<td>5. Cable Requirements</td>
<td>14</td>
</tr>
<tr>
<td>5.1 Internal Cable Plug Dimensions</td>
<td>14</td>
</tr>
<tr>
<td>5.2 Vertical Internal Cable Receptacle Dimensions</td>
<td>19</td>
</tr>
<tr>
<td>5.3 Right Angle Internal Cable Receptacle Dimensions</td>
<td>23</td>
</tr>
<tr>
<td>5.4 Cable Mechanical Performance &amp; Reliability</td>
<td>27</td>
</tr>
<tr>
<td>6. 4C-HP Connector Requirements</td>
<td>30</td>
</tr>
<tr>
<td>6.1 Mechanical Dimensions</td>
<td>30</td>
</tr>
<tr>
<td>6.2 Electrical Requirements</td>
<td>32</td>
</tr>
<tr>
<td>6.3 Power Sequencing Requirements</td>
<td>32</td>
</tr>
<tr>
<td>7. 280 Pin Vertical Connector</td>
<td>33</td>
</tr>
<tr>
<td>7.1 Mechanical Dimensions</td>
<td>33</td>
</tr>
<tr>
<td>Appendix A. PCB Footprints</td>
<td>36</td>
</tr>
<tr>
<td>A.1 Vertical Internal Cable Receptacle Footprints</td>
<td>36</td>
</tr>
<tr>
<td>A.2 Right Angle Internal Cable Receptacle Footprints</td>
<td>37</td>
</tr>
<tr>
<td>A.3 280 Pin Connector PCB Footprint</td>
<td>38</td>
</tr>
<tr>
<td>Appendix B. Media Bay Example</td>
<td>40</td>
</tr>
</tbody>
</table>

Cables and Connector Variants Based on SFF-TA-1002

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Cables and Connector Variants Based on SFF-TA-1002

Copyright © 2019 SNIA. All rights reserved.
1. Scope

This specification defines the electrical, mechanical, reliability, and manufacturing requirements of SFF-TA-1002 based cables and connectors. The connectors in this specification leverage the SFF-TA-1002 wherever possible while enabling additional features such as cable attach, high power, and high pin count for additional applications.

2. References and Conventions

2.1 Industry Documents

The following documents are relevant to this specification:
- ASME Y14.5 Dimensioning and Tolerancing
- EIA-364-1000 Environmental Test Methodology for Assessing the Performance of Electrical Connectors and Sockets Used in Controlled Environment Applications
- EIA-364-05 Contact Insertion, Release and Removal Force Test Procedure for Electrical Connectors published by the Electronic Industries Alliance
- EIA-364-13 Mating and Unmating Force Test Procedure for Electrical Connectors and Sockets published by the Electronic Industries Alliance
- EIA 364-23 Low Level Contact Resistance Test Procedures for Electrical Connectors and Sockets published by the Electronic Industries Alliance
- EIA-364-27 Shock Test Procedure for Electrical Connectors published by the Electronic Industries Alliance
- EIA-364-28 Vibration Test Procedure for Electrical Connectors and Sockets published by the Electronic Industries Alliance
- REF-TA-1011 Cross Reference to Select SFF Connectors
- SFF-TA-1002 Protocol Agnostic Multi-Lane High Speed Connector

2.2 Sources

The complete list of SFF documents which have been published, are currently being worked on, or that have been expired 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.

Copies of PCIe standards may be obtained from PCI-SIG (http://pcisig.com).
Copies of ASME standards may be obtained from the American Society of Mechanical Engineers (https://www.asme.org).
Copies of Electronic Industries Alliance (EIA) standards may be obtained from the Electronic Components Industry Association (ECIA) (https://www.ecianow.org).
2.3 Conventions

The following conventions are used throughout this document:

DEFINITIONS
Certain words and terms used in this standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in the definitions or in the text where they first appear.

ORDER OF PRECEDENCE
If a conflict arises between text, tables, or figures, the order of precedence to resolve the conflicts is text; then tables; and finally figures. Not all tables or figures are fully described in the text. Tables show data format and values.

LISTS
Lists sequenced by lowercase or uppercase letters show no ordering relationship between the listed items.

EXAMPLE 1 - The following list shows no relationship between the named items:

a. red (i.e., one of the following colors):
   A. crimson; or
   B. pink;

b. blue; or

c. green.

Lists sequenced by numbers show an ordering relationship between the listed items.

EXAMPLE 2 - The following list shows an ordered relationship between the named items:

1. top;
   2. middle; and
   3. bottom.

Lists are associated with an introductory paragraph or phrase, and are numbered relative to that paragraph or phrase (i.e., all lists begin with an a. or 1. entry).

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

NUMBERING CONVENTIONS
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.

<table>
<thead>
<tr>
<th>American</th>
<th>French</th>
<th>ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>0,6</td>
<td>0,6</td>
</tr>
<tr>
<td>1,000</td>
<td>1 000</td>
<td>1 000</td>
</tr>
<tr>
<td>1,323,462.9</td>
<td>1 323 462,9</td>
<td>1 323 462,9</td>
</tr>
</tbody>
</table>
3. Keywords, Acronyms, and Definitions

For the purposes of this document, the following keywords, acronyms, and definitions apply.

3.1 Keywords

May/ may not: Indicates flexibility of choice with no implied preference.

Obsolete: Indicates that an item was defined in prior specifications but has been removed from this specification.

Optional: 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.

Prohibited: Describes a feature, function, or coded value that is defined in a referenced specification to which this SFF specification makes a reference, where the use of said feature, function, or coded value is not allowed for implementations of this specification.

Reserved: Defines the signal on a connector contact [when] its actual function is set aside for future standardization. It is not available for vendor specific use. Where this term is used for bits, bytes, fields, and code values; the bits, bytes, fields, and code values are set aside for future standardization. The default value shall be zero. The originator is required to define a Reserved field or bit as zero, but the receiver should not check Reserved fields or bits for zero.

Restricted: Refers to features, bits, bytes, words, and fields that are set aside for other standardization purposes. If the context of the specification applies the restricted designation, then the restricted bit, byte, word, or field shall be treated as a reserved bit, byte, word, or field (e.g., a restricted byte uses the same value as defined for a reserved byte).

Shall: Indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products that conform to this specification.

Should: Indicates flexibility of choice with a strongly preferred alternative.

Vendor specific: Indicates something (e.g., a bit, field, code value) that is not defined by this specification. Specification of the referenced item is determined by the manufacturer and may be used differently in various implementations.

3.2 Acronyms and Abbreviations

AIC: Add In Card

HP: High Power

PCB: Printed Circuit Board

PTH: Plated Through Hole

RA: Right Angle

SMT: Surface Mount Technology
3.3 Definitions

**Connector:** Each half of an interface that, when joined together, establish electrical contact and mechanical retention between two components. In this specification, the term connector does not apply to any specific gender; it is used to describe the receptacle, the plug or the card edge, or the union of receptacle to plug or card edge.

Other common terms include: connector interface, mating interface, and separable interface.

**Contact mating sequence:** A term used to describe the order of electrical contact established/terminated during mating/un-mating. Other terms include: contact sequencing, contact positioning, mate first/break last, EMLB (early mate late break) staggered contacts, and long pin/short pin.

**Contacts:** A term used to describe connector terminals that make electrical connections across a separable interface.

**Module:** In this specification, module may refer to a plug assembly at the end of a copper (electrical) cable (passive or active), an active optical cable (AOC), an optical transceiver, or a loopback.

**Plug:** A term used to describe the connector that contains the penetrating contacts of the connector interface as shown in Figure 3-1. Plugs typically contain stationary contacts. Other common terms include male, pin connector, and card edge.

![Figure 3-1 Plug and Receptacle Definition](image_url)

**Plated through hole termination:** A term used to describe a termination style in which rigid pins extend into or through the PCB. Pins are soldered to keep the connector or cage in place. Other common terms are through hole or PTH.

**Press fit:** A term used to describe a termination style in which collapsible pins penetrate the surface of a PCB. Upon insertion, the pins collapse to fit inside the PCB’s plated through holes. The connector or cage is held in place by the interference fit between the collapsed pins and the PCB.

**Receptacle:** A term used to describe the connector that contains the contacts that accept the plug contacts as shown in Figure 3-1. Receptacles typically contain spring contacts. Other common terms include female and socket connector.
Right Angle: A term used to describe either a connector design where the mating direction is parallel to the plane of the printed circuit board upon which the connector is mounted or a cable assembly design where the mating direction is perpendicular to the bulk cable.

Straight: A term used to describe a connector design where the mating direction is parallel to the bulk cable.

Surface mount: A term used to describe a termination style in which solder tails sit on pads on the surface of a PCB and are then soldered to keep the connector or cage in place. Other common terms are surface mount technology or SMT.

Termination: A term used to describe a connector’s non-separable attachment point. Common PCB terminations include: surface mount (SMT), plated through hole termination (PTH), and press fit (PF). Common cable terminations include insulation displacement contact (IDC), insulation displacement termination (IDT), wire slots, solder, welds, crimps, and brazes.

Vertical: A term used to describe a connector design where the mating direction is perpendicular to the printed circuit board upon which the connector is mounted.

Wipe: The distance a contact travels on the surface of its mating contact during the mating cycle as shown in Figure 3-3.
4. General Description

As stated, this specification defines cables and additional connector variants for the SFF-TA-1002 connector ecosystem. Figure 4-1 illustrates the additional connector variations, 4C-HP and 280 Pin Connector, compared to SFF-TA-1002 connectors. These connectors provide the following:

- 1C connector supports up to 8 differential pairs of data signals as specified in SFF-TA-1002.
- 2C connector supports up to 16 differential pairs of data signals as specified in SFF-TA-1002.
- 4C connector supports up to 32 differential pairs of data signals as specified in SFF-TA-1002.
- 4C-HP connector supports up to 32 differential pairs of data signals as specified in SFF-TA-1002, and a high-power interface as specified in this document.
- 280 Pin connector supports up to 90 differential pairs of data signals.

Figure 4-1. SFF-TA-1002 Connector Sizes for Reference and 4C-HP and 280 Pin Connectors

Figure 4-2 illustrates the internal cable plugs and connectors defined in this specification.

4.1 Interoperability

Table 4-1 illustrates the interoperability of the cables and connector variants defined in this specification and SFF-TA-1002 connectors. AICs interoperate as follows:

- A 1C AIC shall interoperate with a 1C, 2C, 4C, or 4C-HP connector.
- A 2C AIC shall interoperate with a 1C, 2C, 4C, or 4C-HP connector.
- A 4C AIC shall interoperate with a 1C, 2C, 4C, or 4C-HP connector.
- A 4C-HP AIC shall interoperate with a 1C, 2C, 4C, or 4C-HP connector.
  - A 4C-HP that supports 12V shall interoperate with a 4C-HP 12V keyed connector.
A 4C-HP that supports 48V shall interoperate with a 4C-HP 48V keyed connector.

If an AIC supports multiple connectors, then each 1C, 2C, 4C, or 4C-HP shall operate as described above. Internal cable plugs and receptacles are specified for 1C, 2C and 4C sizes in this specification, and shall support the interoperability specified in Table 4-1.

Table 4-1. Cable and AIC Interoperability Matrix

<table>
<thead>
<tr>
<th>Host Board</th>
<th>Module Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C Card Edge Only</td>
<td></td>
</tr>
<tr>
<td>2C Card Edge Only</td>
<td></td>
</tr>
<tr>
<td>4C Card Edge Only</td>
<td></td>
</tr>
<tr>
<td>1C Cable Recept</td>
<td></td>
</tr>
<tr>
<td>2C Cable Recept</td>
<td></td>
</tr>
<tr>
<td>4C Cable Recept</td>
<td></td>
</tr>
</tbody>
</table>

The internal cable plug and receptacle interoperability is illustrated in Figure 4-3 and Figure 4-4.
Figure 4-4. Right Angle Internal Cable Connector and AIC Interoperability
5. Cable Requirements

Cables support an active latching retention system to prevent accidental disconnection of the interface. The mating receptacle has mechanical support hardware providing strain relief and latching for the mating cable plug. The internal cable receptacles and plugs are specified in 1C, 2C and 4C configurations. All dimensions not specified in this document shall be as specified in SFF-TA-1002. The datum names are consistent for the receptacle connectors from SFF-TA-1002 with additional datum(s) added for the internal cable supporting structure.

- A 1C, 2C, or 4C internal cable may support power.
- An internal cable may support sideband signals.
- An internal cable that does not support power and / or sideband signals shall implement the full AIC interface including board dimensions and plated pads to ensure proper mechanical alignment between the connector contacts and the AIC pads and to avoid damage to the AIC and host.

5.1 Internal Cable Plug Dimensions

The internal cable plug dimensions illustrated in this section support both straight cable exit and right angle cable exit. All dimensions and tolerances conform to ASME Y14.5-2009. Tolerance unless otherwise specified +/- 0.13mm.

![Straight Cable Exit](image1) ![Right Angle Cable Exit](image2)

Figure 5-1 Side Profile Illustration for Straight and Right Angle Internal Cable Exit Plugs

The following internal cable plugs are specified to enable an internal cable-to-cable pitch of 9.3mm. For host designs that do not require a 9.3mm pitch, lower profile internal cable plugs (less than 21.5mm dimension below) may be enabled using wider housings (greater than 9mm dimension below).
The internal cable plug requires a "push" operation to disengage the plug latch from the receptacle. To support a user's ability to disengage a mated internal cable when adjacent to another mated internal cable at the enabled internal cable-to-cable pitch, an alternative implementation using a pull tab is illustrated in Figure 5-3. The mechanism in the internal cable plug is required to support disengagement actuation through a both a "push" operation and a "pull" operation (each functionally independent within the same plug).

Developer Note: DC blocking capacitors may be placed on the host PCB, AIC PCB or, if needed per implementation, may be placed on the cable PCB within the cable plug assembly. The implementer should avoid redundant DC blocking capacitors in the channel. Depending on implementation, a cable plug assembly with DC blocking capacitors may require extending beyond the 21.5mm MAX height requirement.
Figure 5-4. 1C Internal Cable Plug Mechanical Dimensions
Figure 5-5. 2C Internal Cable Plug Mechanical Dimensions
Figure 5-6. 4C Internal Cable Plug Mechanical Dimensions

Figure 5-7. Internal Cable Plug Detail Views
5.2 Vertical Internal Cable Receptacle Dimensions

The following figures illustrate mechanical dimensions of the vertical internal cable receptacles. Note: Datum J applies to the cable receptacle housing and Datum C applies to the connector body.
Figure 5-9. Side Profile of Vertical Internal Cable Receptacle Mechanical Dimensions
Figure 5-10. 1C Vertical Internal Cable Receptacle Mechanical Dimensions
Figure 5-11. 2C Vertical Internal Cable Receptacle Mechanical Dimensions
5.3 Right Angle Internal Cable Receptacle Dimensions

Figure 5-12. 4C Vertical Internal Cable Receptacle Mechanical Dimensions
Figure 5-13. Side Profile of Right Angle Internal Cable Receptacle Mechanical Dimensions
Figure 5-14. 1C Right Angle Internal Cable Receptacle Mechanical Dimensions
Figure 5-15. 2C Right Angle Internal Cable Receptacle Mechanical Dimensions
5.4 Cable Mechanical Performance & Reliability

The following specifies the reliability testing requirements of internal cables receptacles and plugs. Unless otherwise specified in this section, the receptacles and plugs shall meet all reliability and mechanical testing requirements specified in SFF-TA-1002.

<table>
<thead>
<tr>
<th>Table 5-1. Internal Cable Assembly Test Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
</tr>
<tr>
<td>Low Level Contact Resistance</td>
</tr>
<tr>
<td>Durability (preconditioning)</td>
</tr>
<tr>
<td>Durability Cycles</td>
</tr>
<tr>
<td>Axial Latch Retention</td>
</tr>
<tr>
<td>Reliability Test Description</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>Durability (preconditioning)</td>
</tr>
<tr>
<td>Temperature Life (preconditioning)</td>
</tr>
<tr>
<td>Low Level Contact Resistance (LLCR)</td>
</tr>
<tr>
<td>Mechanical Shock</td>
</tr>
<tr>
<td>Vibration</td>
</tr>
<tr>
<td>Axial Latch Retention</td>
</tr>
<tr>
<td>Latitudinal/Longitudinal Pull Force</td>
</tr>
</tbody>
</table>

## Table 5-3. Internal Cable Assembly Additional Requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Procedure</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mating Force</td>
<td>EIA-364-13</td>
<td>SFF-TA-1002 Requirements + 10N MAX</td>
</tr>
<tr>
<td>Durability Cycles</td>
<td>EIA-364-30</td>
<td>25 cycles min</td>
</tr>
<tr>
<td>Description</td>
<td>Procedure</td>
<td>Requirement</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>N/A</td>
<td>-20°C to +85°C degrees</td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td>80% Relative Humidity</td>
</tr>
</tbody>
</table>

1 Requirements and attributes not specified in this section or in SFF-TA-1002 shall specified by the manufacturer of the internal cable receptacle or internal cable plug assembly.
6. 4C-HP Connector Requirements

This section specifies a variation of the SFF-TA-1002 connector that adds an additional high-power interface to the 4C interface. 4C-HP 12V/48V High-Power Connector General View illustrates a general view of the high-power AIC and connector. A key is used to prevent 180 degree insertion, mixing incompatible voltages of AICs and connectors, and plugging in a 4C+ AIC as specified in SFF-TA-1002.

6.1 Mechanical Dimensions

All dimensions and tolerances are in millimeters, and conform to ASME Y14.5-2009.

Figure 6-1. 4C-HP 12V/48V High-Power Connector General View

Figure 6-2. 4C-HP 12V/48V High-Power Connector Dimensions
Figure 6-3. 4C-HP 12V/48V High-Power Connector Pin Locus

Note: Position A1 on opposite side of card of B1

Figure 6-4. 4C-HP 12V/48V High-Power AIC Dimensions

Table 6-1. Dimensions for High-Power 12V and 48V AICs, Connectors and Footprints

<table>
<thead>
<tr>
<th>Dimension</th>
<th>12V AIC</th>
<th>48V AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.05</td>
<td>4.05</td>
</tr>
<tr>
<td>B</td>
<td>32.31</td>
<td>33.31</td>
</tr>
<tr>
<td>C</td>
<td>77.89</td>
<td>78.89</td>
</tr>
<tr>
<td>D</td>
<td>21.03</td>
<td>21.53</td>
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<td>E</td>
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<td>25.39</td>
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<tr>
<td>F</td>
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<td>G</td>
<td>57.31</td>
<td>58.31</td>
</tr>
<tr>
<td>H</td>
<td>42.60</td>
<td>43.60</td>
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<td>J</td>
<td>54.86</td>
<td>55.86</td>
</tr>
<tr>
<td>K</td>
<td>75.34</td>
<td>76.34</td>
</tr>
<tr>
<td>L</td>
<td>76.89</td>
<td>78.89</td>
</tr>
<tr>
<td>M</td>
<td>3.57</td>
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<td>N</td>
<td>37.67</td>
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</tr>
<tr>
<td>P</td>
<td>79.74</td>
<td>80.74</td>
</tr>
</tbody>
</table>
### 6.2 Electrical Requirements

The 4C-HP connector shall support up to 55A through the high-power connector.

- Host designs that support the high-power interface shall provide 12V +/- 10% (10.8V to 13.2V) or 48V +/- 10% (43.2V to 52.8V) to the connector.
- 12V connectors shall support power pins specified in the 1C section and the high-power section of the connector to enable maximum of 660W at worst-case voltage conditions.
- 48V connectors shall support power only through the high-power section of the connector, i.e., not through the 1C section.

### 6.3 Power Sequencing Requirements

High-power AIC and hosts shall support a maximum power draw of 25W at initialization.

- A 48V AIC shall draw all power from the high-power pins, and shall not connect to any other power pins in the connector.
- A 12V AIC shall draw only from the 1C section of the connector at initialization and may draw from both the high-power pins and 1C section once enabled to draw more than 25W.
7. **280 Pin Vertical Connector**

This section specifies a variation of the SFF-TA-1002 connector that contains 280 positions leveraging the SFF-TA-1002 interface. An example use case is a 32 lane PCIe riser card. A key is used to prevent 180 degree insertion and plugging in a 2C, 4C or 4C+ AIC.

![Figure 7-1. 280 Pin Connector General View](image)

7.1 **Mechanical Dimensions**

All dimensions and tolerances are in millimeters, and conform to ASME Y14.5-2009. For dimensions not shown, reference SFF-TA-1002.
Cables and Connector Variants Based on SFF-TA-1002

Figure 7-2. 280 Pin Connector Dimensions

Figure 7-3. 280 Pin Connector Pin Locus

Figure 7-4. 280 Pin Connector SMT Lead Locus
Figure 7-5. 280 Pin AIC Dimensions
Appendix A. PCB Footprints

A.1 Vertical Internal Cable Receptacle Footprints

All material within this section, whether defined as normative or informative, is subject to IP disclosure and RAND terms by SNIA SFF TA TWG member companies. The following figures show informative PCB footprints for internal vertical internal cable receptacle connector. All other dimensions of footprints are per SFF-TA-1002.

Figure A-1. 1C Vertical Internal Cable Receptacle Footprint

Figure A-2. 2C Vertical Internal Cable Receptacle Footprint
A.2 Right Angle Internal Cable Receptacle Footprints

The following figures show informative PCB footprints for internal right angle cable receptacle connector. All other dimensions of footprints are per SFF-TA-1002.
The following figures show informative PCB footprints for the 4C-HP 12V and 48V connectors. Refer to Table 6-1 for tabularized dimensions. All other dimensions of footprints are per SFF-TA-1002.

A.3 280 Pin Connector PCB Footprint

A.4 280 Pin Connector PCB Footprint

The following figures show informative PCB footprints for the 280 Pin connector. All other dimensions of footprints are per SFF-TA-1002.
Figure A-8. 280 Pin Connector Reference Footprint Dimension
B. Appendix B. Media Bay Example

The following describes an example implementation of cables and connectors in a Media Bay application, where a Media Bay is a 3-D mechanical structure with a back panel PCB (BP) that accepts user pluggable media modules with the SFF-TA-1002 connector interface as illustrated in Figure B-1. The BP illustrates a 4C vertical connector that accepts a media module on one side and a 4C vertical internal cable receptacle placed directly opposite on the other side. An internal cable plugs into the 4C internal cable receptacle connector and into internal host resources.

![Figure B-1. Media Bay Module Mated with PCB equipped with SFF-TA-1002 4C Connector](image)

The front media SFF-TA-1002 connector and the back internal cable SFF-TA-1002 connector are mounted precisely opposite on the BP PCB. This configuration provides the following benefits:

- Maximizes through BP airflow for cooling media modules and downstream components.
- Enables tighter module pitch.
- Enables cooling solutions for high-power devices.
- Eliminates signal trace lengths, signal swapping, and cross-over cabling as the pinouts are maintained on both connectors.
- Minimizes VIAs and short traces on the BP to support higher signaling rates.

The signal pinout for the internal media and rear internal cable are as specified in this document.

The BP layout illustrated maintains commonality of signal assignments on each connector by routing signals through VIAs on the rear of the BP to the front.
For modules that require the 4C-HP high-power connector and/or 48V, it is recommended that power be distributed through the BP to the power pins on the media connector and not delivered through the internal cable connector. It is recommended that 12V and non-high-speed differential pairs be provided through the BP distribution and/or be populated as needed. Figure B-3 illustrates a recommended implementation of the 4C connectors to allow for BP belly-to-belly placement.
Figure B-3. 4C Vertical Media Bay / Internal Cable Receptacle Modifications