SFF-8458

Former Specification for

Combination Connectors Including a USB 3.0 Micro-B Receptacle or Plug

Rev 1.0 November 12, 2021

SECRETARIAT: SFF TA TWG

ABSTRACT: This specification formerly defined the dimensions and signal assignments of the combination connector including a USB 3.0 Micro-B receptacle and the combination connector including a USB 3.0 Micro-B plug. The combination connector including a USB 3.0 Micro-B receptade includes a USB 3.0 Micro-B receptacle mounted in a housing that includes blind mate features and an additional connector section similar to the SATA connector power section that provides power alternatives and optional vendor specific feature pins. The device with a combination connector including a USB 3.0 Micro-B receptacle may be used with a combination connector including a USB 3.0 Micro-B plug (backplane connector) that allows support of vendor specific features. Alternately, it may be used with a USB cable having a Micro-B plug (and a standard SATA power cable, if required), although this configuration does not provide connections for the optional vendor specific features.

REASON FOR EXPIRATION: Obsolete
This specification is no longer relevant to the industry because this connector was not implemented.

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SFF Committee documentation may be purchased in hard copy or electronic form.
SFF specifications are available at ftp://ftp.seagate.com/sff

SFF Committee

SFF-8458 Specification for

Combination Connectors Including a USB 3.0 Micro-B Receptacle or Plug

Rev 0.3 January 6, 2011

Secretariat: SFF Committee

Abstract: This specification defines the dimensions and signal assignments of the combination connector including a USB 3.0 Micro-B receptacle and the combination connector including a USB 3.0 Micro-B plug. The combination connector including a USB 3.0 Micro-B receptacle includes a USB 3.0 Micro-B receptacle mounted in a housing that includes blind mate features and an additional connector section similar to the SATA connector power section that provides power alternatives and optional vendor specific feature pins. The device with a combination connector including a USB 3.0 Micro-B receptacle may be used with a combination connector including a USB 3.0 Micro-B plug (backplane connector) that allows support of vendor specific features. Alternately, it may be used with a USB cable having a Micro-B plug (and a standard SATA power cable, if required), although this configuration does not provide connections for the optional vendor specific features.

This document provides a common specification for systems manufacturers, system integrators, and suppliers of drives. This is an internal working document of the SFF Committee, an industry ad hoc group.

This document 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 document.

The description of a connector in this document 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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EXPRESSION OF SUPPORT BY MANUFACTURERS

The following member companies of the SFF Committee voted in favor of this industry specification.

Cinch
EMC
FCI
Foxconn
Hitachi GST
Seagate
Volex

The following member companies of the SFF Committee voted to abstain on this industry specification.

Finisar
LSI
Molex
NetApp
NetLogic uSyst
Sandisk
Toshiba
Tyco

Foreword

The development work on this specification was done by the SFF Committee, an industry group. The membership of the committee since its formation in August 1990 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 first use of these disk drives was in specific applications such as laptop portable computers and system integrators worked individually with vendors to develop the packaging. The result was wide diversity, and incompatibility.

The problems faced by integrators, device suppliers, and component suppliers led to the formation of the SFF Committee as an industry ad hoc group to address the marketing and engineering considerations of the emerging new technology.

During the development of the form factor definitions, other activities were suggested because participants in the SFF Committee faced more problems than the physical form factors of disk drives. 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.

Those companies which have agreed to support a specification are identified in the first pages of each SFF Specification. Industry consensus is not an essential requirement to publish an SFF 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 Committee meetings are held during T10 weeks (see www.t10.org), and Specific Subject Working Groups are held at the convenience of the participants. Material presented at SFF Committee meetings becomes public domain, and there are no restrictions on the open mailing of material presented at committee meetings.

Most of the specifications developed by the SFF Committee have either been incorporated into standards or adopted as standards by EIA (Electronic Industries Association), ANSI (American National Standards Institute) and IEC (International Electrotechnical Commission).

If you are interested in participating or wish to follow the activities of the SFF Committee, the signup for membership and/or documentation can be found at:

www.sffcommittee.com/ie/join.html

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

ftp://ftp.seagate.com/sff/SFF-8000.TXT

If you wish to know more about the SFF Committee, the principles which guide the activities can be found at:

ftp://ftp.seagate.com/sff/SFF-8032.TXT

Suggestions for improvement of this specification will be welcome. They should be sent to the SFF Committee, 14426 Black Walnut Ct, Saratoga, CA 95070.

Rev 0.1:
Updated plug figure, added receptacle figure, added clause for blind-mate tolerance, updated signal definitions and table entries, added ratings and performance requirements sections.

Rev 0.2:
Changed connector names to "combination connector including a USB 3.0 Micro-B receptacle" and "combination connector including a USB 3.0 Micro-B plug" and made minor editorial changes.

SFF Committee --

Combination Connectors Including a USB 3.0 Micro-B Receptacle or Plug

1. Scope

This specification defines the connector dimensions and signal assignments associated with the combination connector including a USB 3.0 Micro-B receptacle and the combination connector including a USB 3.0 Micro-B plug. It also includes signal requirements for the optional contacts that are not specified by the SATA and USB specifications.

The SFF Committee was formed in August, 1990 to broaden the applications for storage devices, and is an ad hoc industry group of companies representing system integrators, peripheral suppliers, and component suppliers.

1.1 Description of Clauses

Clause 1 contains the Scope and Purpose.

Clause 2 contains Referenced and Related Standards and SFF Specifications.

Clause 3 contains the physical configuration of the combination connector including a USB 3.0 Micro-B receptacle.

Clause 4 contains the physical configuration of the combination connector including a USB 3.0 Micro-B plug.

Clause 5 contains the connector pair blind-mate misalignment tolerance.

Clause 6 contains the signal pin assignments and electrical characteristics.

Clause 7 contains the connector current and temperature ratings.

Clause 8 contains the connector pair performance requirements for the power section.

2. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

2.1 Industry Documents

The following interface and industry standards are relevant to this specification:

- Universal Serial Bus 3.0 Specification
- Serial ATA Revision 3.0 (SATA), 2 June 2009
- ASME Y14.5M Dimensioning and Tolerancing

2.2 SFF Specifications

There are several projects active within the SFF Committee. The complete list of specifications which have been completed or are still being worked on are listed in the specification at ftp://ftp.seagate.com/sff/SFF-8000.TXT

2.3 Sources

Those who join the SFF Committee as an Observer or Member receive electronic copies of the minutes and SFF specifications (http://www.sffcommittee.com/ie/join.html).

Copies of ANSI standards may be purchased from the InterNational Committee for Information Technology Standards (http://tinyurl.com/c4psg).

2.4 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.

English	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

3. Combination connector including a USB 3.0 Micro-B receptacle

Figure 1 shows the combination connector including a USB 3.0 Micro-B receptacle. Dimensions for the SATA power section and the USB 3.0 Micro-B connector are found in the respective specifications published by those organizations. This figure contains dimensions that are unique to the combination connector.

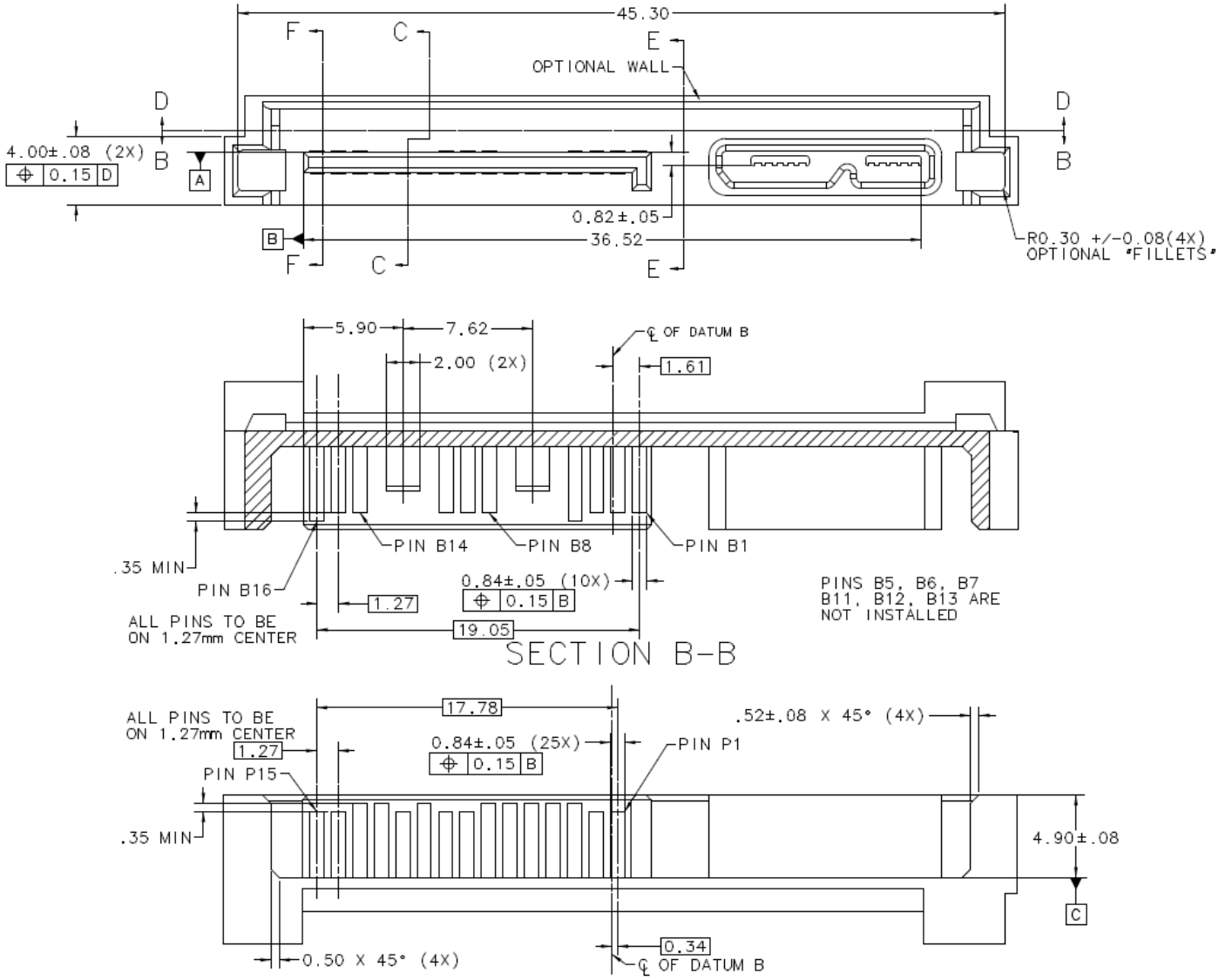
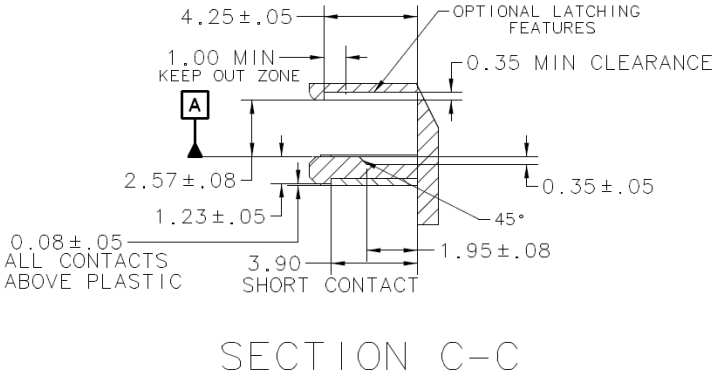
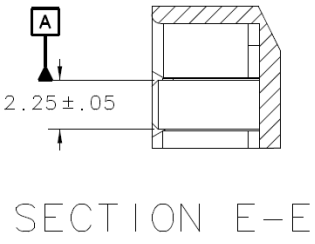
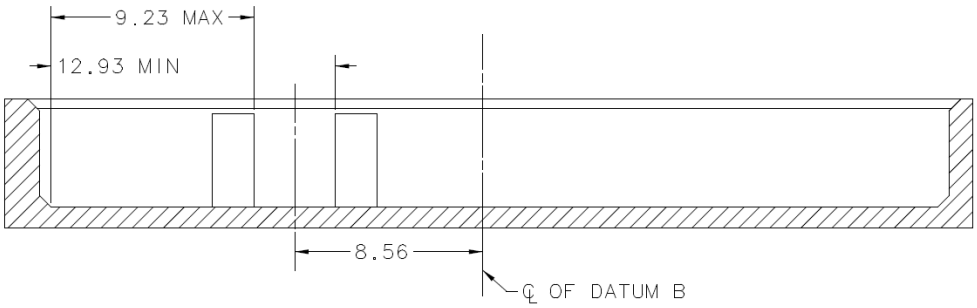


Figure 1. Combination Connector Including a USB 3.0 Micro-B Receptacle







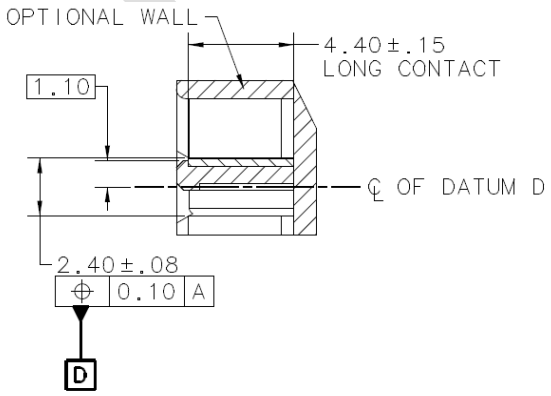


Figure 1 (Continued). Combination Connector Including a USB 3.0 Micro-B Receptacle

4. Combination connector including a USB 3.0 Micro-B plug

Figure 2 shows the combination connector including a USB 3.0 Micro-B plug. Dimensions for the SATA power section and the USB 3.0 Micro-B plug are found in the respective specifications published by those organizations. This figure contains dimensions that are unique to the combination connector.

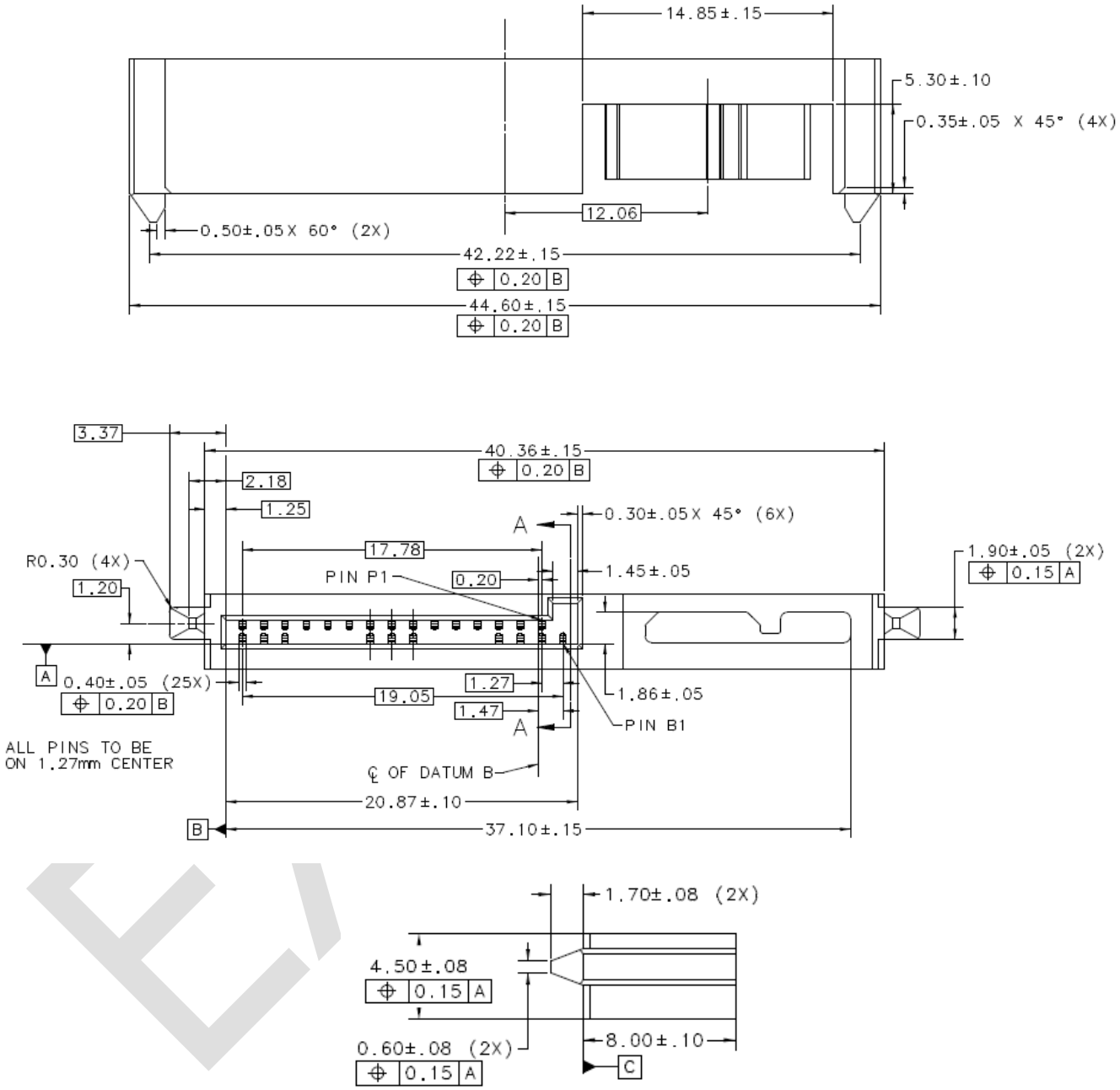


Figure 2. Combination Connector Including a USB 3.0 Micro-B Plug

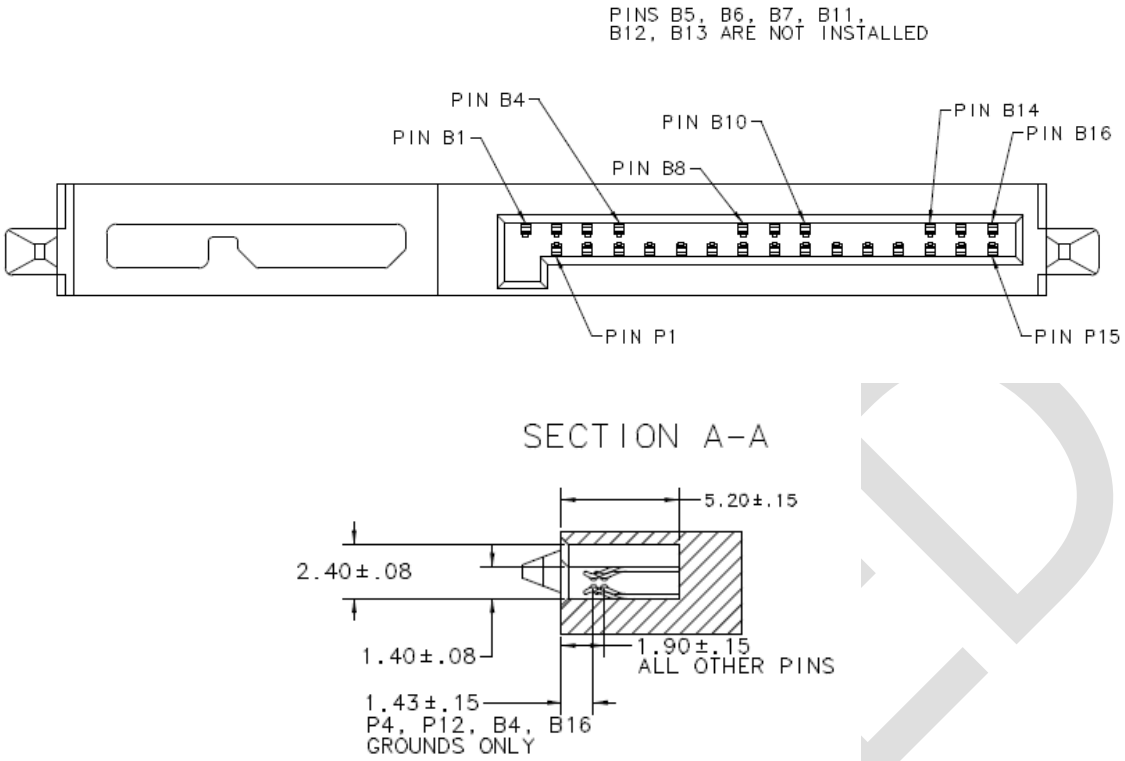


Figure 2 (Continued). Combination Connector Including a USB 3.0 Micro-B Plug

5. Connector pair blind-mate misalignment tolerance

Blind-mate features are provided by the combination connector including a USB 3.0 Micro-B receptacle and the combination connector including a USB 3.0 Micro-B plug to allow the connectors to be used in backplane and other applications where engagement may not be visible. Figure 3 shows the maximum blind-mate misalignment tolerances for the two perpendicular axes. Any skew angle of the plug with respect to the receptacle reduces the blind-mate tolerances.

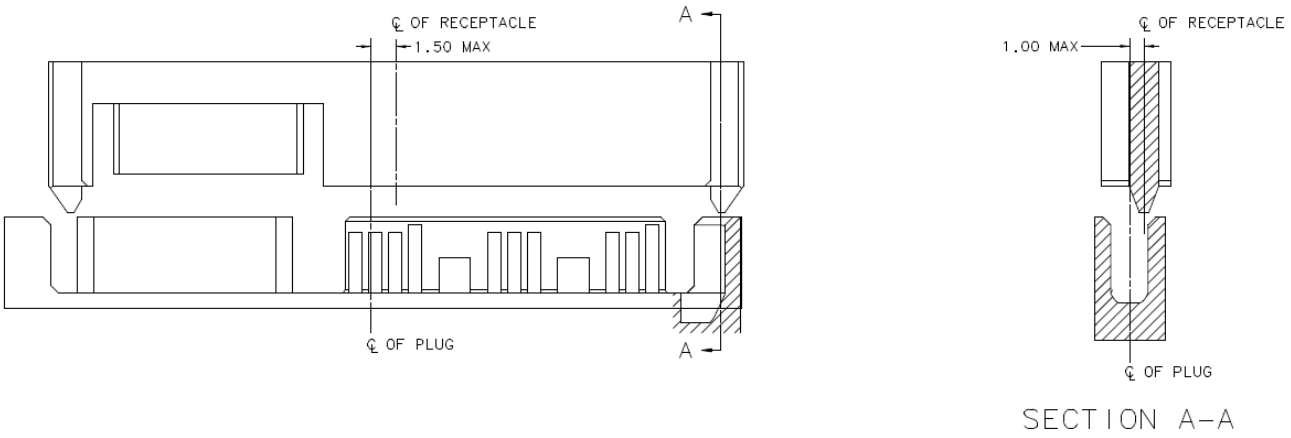


Figure 3. Combination Connector Pair Blind-Mate Misalignment Tolerance

Figure 4 shows the device-to-backplane mating configuration. The dimensions are defined in table 1. The mated height shall be met to provide sufficient contact wipe.

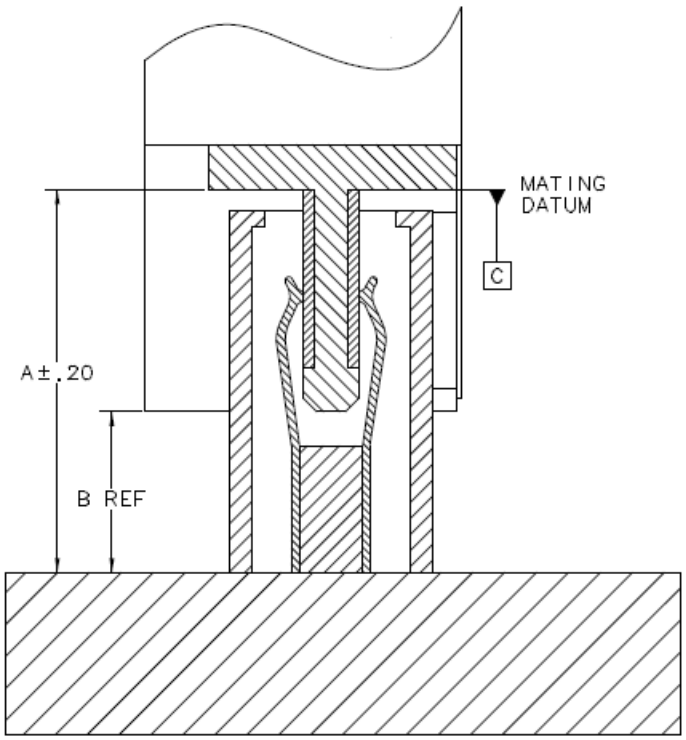


Figure 4. Combination Connector Device-to-Backplane Mating Configuration

Table 1. Combination Connector Mating Dimensions

Dimension	Value	Description
A	8.45	Device mated height
B	3.55	Component clearance

6. Signal pin assignment and electrical characteristics

This section defines the pin assignments and signal characteristics for the combination connector including a USB 3.0 Micro-B receptacle and the combination connector including a USB 3.0 Micro-B plug.

The USB 3.0 section shall comply with the electrical characteristics defined by the USB 3.0 specification.

WARNING: If a device attaches to power from the USB 3.0 section and the SATA power section, the device design shall provide a means of supply isolation so that the two power sources may coexist.

See table 2 for the signal pin assignments. The electrical characteristics for pins unique to the combination connector are defined in this section.

Table 2. Combination Connector Power Pin Assignment

SATA 3.0 Specification				
Name	Type	Description	Cable usage	Backplane usage
P1	V33	3.3V	2nd mate	3rd mate
P2	V33	3.3V	2nd mate	3rd mate
P3	V33pc	3.3V pre-charge	1st mate	2nd mate
P4	GND		1st mate	1st mate
P5	GND		1st mate	2nd mate
P6	GND		1st mate	2nd mate
P7	V5pc	5V pre-charge	1st mate	2nd mate
P8	V5	5V	2nd mate	3rd mate
P9	V5	5V	2nd mate	3rd mate
P10	GND		1st mate	2nd mate
P11	DAS/DSS	Device activity signal/disable staggered spin-up	2nd mate	3rd mate
P12	GND		1st mate	1st mate
P13	V12pc	12V pre-charge	1st mate	2nd mate
P14	V12	12V	2nd mate	3rd mate
P15	V12	12V	2nd mate	3rd mate
USB 3.0 combination connector "B-side" pins (optional)				
B1	VS1	Vendor specific 1	2nd mate	3rd mate
B2	VS2	Vendor specific 2	2nd mate	3rd mate
B3	DAS/DSS	Same as SATA P11	2nd mate	3rd mate
B4	GND		1st mate	1st mate
B5		Omitted due to latching feature		
B6		Omitted due to latching feature		
B7		Omitted due to latching feature		
B8	VS3	Vendor specific 3	2nd mate	3rd mate
B9	VS4	Vendor specific 4	2nd mate	3rd mate
B10	VS5	Vendor specific 5	2nd mate	3rd mate
B11		Omitted due to latching feature		
B12		Omitted due to latching feature		
B13		Omitted due to latching feature		
B14	MD	Manufacturing diagnostic	2nd mate	3rd mate
B15	MD	Manufacturing diagnostic	2nd mate	3rd mate
B16	GND		1st mate	1st mate

The power section pins common with SATA shall have the same pin assignments and electrical characteristics as defined by SATA except if voltage pins are not used by the device, they may be not connected or not present. Voltage and pre-charge pins shall be shorted together on the device for each respective voltage if the pins are present. If presence detection is used, it should be done through the USB interface.

Vendor specific pins (B1, B2, B8, B9, and B10) may be connected to a GPIO on the device, backplane, or host. If connected, the electrical characteristics of table 3 shall apply.

Table 3. Combination Connector Vendor Specific Pins (B1, B2, B8, B9, And B10) Electrical Characteristics

Device electrical requirements				
Absolute Maximum Ratings				
Parameter	Units	Min	Max	Description
V_{DI}	V	-0.5	3.3	Input voltage without permanent damage
Recommended Operating Conditions				
Parameter	Units	Min	Max	Description
V_{DIH}	V	1.17	2.1	High-level input voltage from Host
V_{DIL}	mV		630	Low-level input voltage from Host
V_{DInact}	V		2.1	Output voltage, inactive (ext. host pull-up)
I_{Dinact}	µA	-10	100	Device leakage current when inactive
V_{DOL}	mV	0	225	Output voltage when I_{DOL} = -300 µA
I_{DOL}	µA	-300		Device current sinking capability
Backplane/host electrical requirements				
Absolute Maximum Ratings				
Parameter	Units	Min	Max	Description
V_{HI}	V	-0.5	3.3	Input voltage without permanent damage
Recommended Operating Conditions				
Parameter	Units	Min	Max	Description
V_{HIH}	V	1.17	2.1	High-level input voltage from Device
V_{HIL}	mV		630	Low-level input voltage from Device
V_{HOH}	V	1.4	2.1	High-level Output voltage
I_{HOH}	µA	400		Host current sourcing capability
V_{HOL}	mV	0	225	Low-level output voltage when I_{HOL} = -300 µA
I_{HOL}	µA	-300		Host current sinking capability

Manufacturing diagnostic pins (B14 and B15) shall be not connected on the combination connector including a USB 3.0 Micro-B plug.

7. Ratings

7.1 Current

Power section voltage and ground pins (per pin):
- Continuous Current 1.5A
- Peak Current 2.5A 1.5s
- Peak Current Pre-charge 6A 1ms

Signal section (per pin)
- Continuous Current 500mA

7.2 Temperature

Operating 0°C to 55°C
Non-operating -40°C to 85°C

8. Performance requirements

The connector housing and power section electrical, mechanical, and environmental requirements for mating connectors are specified in table 4, table 5, and table 6, respectively. For the USB section of the connector, refer to the USB 3.0 specification for requirements.

Table 4. Combination connector housing and power section contact electrical requirements

Electrical requirements		
Parameter	Test condition	Requirement
Insulation resistance	Apply a voltage of 500 VDC for 1 minute between adjacent terminals per EIA 364-21	1000 MΩ minimum
Dielectric withstanding voltage	Apply a voltage of 500 VAC for 1 minute between adjacent terminals per EIA 364-20, method B	No breakdown
Low level contact resistance	Mate connectors and apply a maximum voltage of 20 mV and a current of 100 mA per EIA 364-23	30 mΩ maximum (initial)
Temperature rise via current cycling (P1 thru P15)	- Wire three consecutive voltage/pre-charge contact pins (see table 2) in parallel for power - Wire three ground contact pins (see table 2) in parallel for return - Supply 4.5A total DC current to the power pins in parallel, returning through the parallel ground pins - Measure and record the temperature after 96 hours (45 minutes ON and 15 minutes OFF per hour) - Ambient condition is still air at 25° C	The temperature rise shall not exceed 30° C

Table 5. Combination Connector Housing and Power Section Contact Mechanical Requirements

Mechanical requirements		
Parameter	Test condition	Requirement
Connector mating and un-mating forces	Mate and un-mate connectors at a rate of 25 mm per minute per EIA 364-13	Mating force: Backplane – tbd maximum Power cable - 50N maximum Un-mating force: Backplane – tbd minimum Power cable - 20N minimum Initial and after durability
Durability	Mate and un-mate connectors 200 cycles/hour maximum Per EIA 364-09 Backplane - 500 Cycles Cable – 25 Cycles	No damage 15 mΩ maximum change from initial contact resistance
Vibration (random)	Mate connectors and vibrate per EIA 364-28, test condition VII	Discontinuity < 1µs 15 mΩ maximum change from initial contact resistance
Shock (mechanical)	Mate connectors and shock at 50 g's with ½ sine wave (11 ms) shocks in each X,Y & Z axis (18 shocks total) per EIA 364-27	Discontinuity < 1µs 15 mΩ maximum change from initial contact resistance

Table 6. Combination Connector Housing and Power Section Contact Environmental Requirements

Environmental requirements		
Parameter	Test condition	Requirement
Humidity	Subject mated connectors to 96 hours at 40°C with 90-95% relative humidity per EIA 364-31, Method II, Test condition A	No damage 15 mΩ maximum change from initial contact resistance
Temperature life	Subject mated connectors to +85° C for 500 hours per EIA 364-17, Test Condition III, Method A	No damage 15 mΩ maximum change from initial contact resistance
Thermal shock	Subject mated connectors to 10 cycles between –55°C and +85°C per EIA 364-32, Test Condition I	No damage 15 mΩ maximum change from initial contact resistance
Mixed flowing gas	1 half of samples are exposed un-mated for 7 days and then mated for 7 additional days. The other half of samples are exposed mated for full 14 day test period per EIA 364-65, Class 2A	No damage 15 mΩ maximum change from initial contact resistance

Test groups

Samples shall be prepared in accordance with applicable manufacturers' instructions and shall be selected at random from current production. Each test group shall provide 100 data points for a good statistical representation of the test result. For a connector with greater than 20 pins, a test group shall consist of a minimum of five connector pairs. From these connector pairs, a minimum of 20 contact pairs per mated connector shall be selected and identified. For connectors with less than 20 pins, choose the number of connectors sufficient to provide 100 data points.

Test sequences for five groups of connectors is shown in table 7.

Table 7. Combination Connector Housing Test Sequences

Test or examination	Test group				
	A	B	C	D	E
Examination of the connector(s)	1, 5	1, 9	1, 8	1, 8	1, 7
Low level contact resistance	2, 4	3, 7	2, 4, 6		4, 6
Insulation resistance				2, 6	
Dielectric withstanding voltage				3, 7	
Temperature rise[2]			7		
Mating force		2			
Un-mating force		8			
Durability	3	4[1]			2[1]
Shock (mechanical)		6			
Vibration (random)		5			
Humidity				5	
Temperature life			3		
Reseating (manually unplug/plug three times)			5		5
Mixed flowing gas					3
Thermal shock				4	

NOTE –
1. Preconditioning, 50 cycles for the 500-durability cycle requirement. The insertion and removal cycle is at the maximum rate of 200 cycles per hour.
2. Temperature rise testing may be omitted if no 3.3V, 5V, or 12V contacts are present (see table 2).