1 Scope

2 Normative references

3 Definitions, symbols, abbreviations, and conventions

4 General

4.1 General overview

4.2 Cables, connectors, signals, transceivers

4.3 Physical architecture of bus

4.4 Driver-receiver connections

4.5 Physical topology details and definitions

4.6 Bus loading

4.7 Termination requirements

4.8 Device addressing

4.9 Clocking methods for data transfer

4.10 Data transfer mode

4.11 Negotiation

4.11.1 Negotiation introduction

4.11.2 Negotiation algorithm

4.11.3 When to negotiate

4.11.4 Negotiable fields

4.11.5 Negotiation message sequences

4.12 Protocol
5 Interface connectors and cabling

5.1 Interface connectors and cabling overview

5.2 Connectors

5.2.1 Connector 1

5.2.2 Connector 2

5.2.3 Connector contact assignments

5.3 Cables

6 Electrical characteristics

6.1 Electrical characteristics overview

6.2 ADP compliance points

An ADP compliance point is a defined point in the ADP physical interconnection. At an ADP compliance point a compliant device shall meet the ADP interoperability specifications. ADP compliance points always occur at separable connectors. Table n lists the ADP compliance points.

<table>
<thead>
<tr>
<th>Compliance point</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>intra-enclosure</td>
<td>Target port connector; transmit serial port</td>
</tr>
<tr>
<td>Tᵣ</td>
<td>intra-enclosure</td>
<td>Target port connector; receive serial port</td>
</tr>
<tr>
<td>C₁</td>
<td>inter-enclosure</td>
<td>External cabinet connector; transmit serial port</td>
</tr>
<tr>
<td>Cᵣ</td>
<td>inter-enclosure</td>
<td>External cabinet connector; receive serial port</td>
</tr>
</tbody>
</table>

6.3 ADP reference points

An ADP reference point is a defined point in the ADP physical interconnection. Every ADP compliance point is an ADP reference point. Table n lists the ADP reference points in addition to the ADP compliance points listed in Table n.

<table>
<thead>
<tr>
<th>Reference point</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I₁</td>
<td>Initiator port connector; transmit serial port</td>
</tr>
<tr>
<td>Iᵣ</td>
<td>Initiator port connector; receive serial port</td>
</tr>
</tbody>
</table>
6.4 Signal states

6.4.1 Single ended signals

Single ended signals always exist in one of two states: true (i.e., asserted) or false (i.e., negated). The device that asserts a signal shall actively drive the signal to the true state. A device that negates a signal may either actively drive the signal to the false state or refrain from driving the signal to either state. A non-driven signal goes to the false state because the bias of the terminator pulls the signal false.

NOTE n - Actively negated signals have the advantage of a higher noise margin over signals negated via terminator bias.

6.4.2 Differential signals

6.5 Sense connection

A Sense connection is a complete uni-directional signal path from the output reference point of one ADI device to the input reference point of a second ADI device.

6.6 Signal connection

A Signal connection is a complete uni-directional signal path from the output reference point of one ADI device to the input reference point of a second ADI device. A signal connection shall use single ended signaling.

6.7 Transmit-receive connection

A Transmit-receive (Tx-Rx) connection is a complete simplex signal path from the output reference point of one ADI device to the input reference point of a second ADI device. A Tx-Rx connection shall use differential signaling.

This section specifies characteristics of the electrical signal and the signaling media at the compliance points $T_t$, $T_r$, $C_t$, and $C_r$ in a Tx-Rx connection.

All Tx-Rx connections shall operate with a Bit Error Rate (BER) $< 10^{-12}$. The parameters specified in this section support meeting the BER requirement under all conditions including the minimum input and output amplitude levels.

Specifications are based on ensuring interoperability across multiple vendors supplying theologies (transceivers and cable plants) under the tolerance limits specified in the document. Tx-Rx connections operating at the maximum specified distance may require some form of equalization (e.g., transmitter pre-emphasis, receiver adaptive equalization, or passive cable equalization) to enable the connection to meet the signal requirements. A specific installation may obtain a longer distance by engineering a Tx-Rx connection based on knowledge of the technology characteristics and the conditions of installation and operation (e.g., a closed engineering environment); however, such distance extensions are outside the scope of this standard.

Table n defines the general interface characteristics.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2.4 kbps</th>
<th>4.8 kbps</th>
<th>9.6 kbps</th>
<th>19.2 kbps</th>
<th>38.4 kbps</th>
<th>57.6 kbps</th>
<th>76.8 kbps</th>
<th>115.2 kbps</th>
<th>153.6 kbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data rate (bps)</td>
<td>2400</td>
<td>4800</td>
<td>9600</td>
<td>19200</td>
<td>38400</td>
<td>57600</td>
<td>76800</td>
<td>115200</td>
<td>153600</td>
</tr>
<tr>
<td>Nominal bit rate (baud)</td>
<td>2400</td>
<td>4800</td>
<td>9600</td>
<td>19200</td>
<td>38400</td>
<td>57600</td>
<td>76800</td>
<td>115200</td>
<td>153600</td>
</tr>
<tr>
<td>Unit interval</td>
<td>416667</td>
<td>208333</td>
<td>104167</td>
<td>52083</td>
<td>26041667</td>
<td>17361111</td>
<td>13020833</td>
<td>8680556</td>
<td>6510417</td>
</tr>
</tbody>
</table>
### 6.8 Eye Masks

#### 6.8.1 Eye masks overview

The eye masks shown in this clause provide graphical representations of the voltage and time limits. The time values between X1 and 1-X1 cover all but $10^{-12}$ of the jitter population. The random content of the total jitter population has a range of $\pm 7\sigma$. Current oscilloscope technology only supports approximately $\pm 3\sigma$, therefore the traditional method of using an oscilloscope to compare the signals against these masks to ascertain jitter compliance is invalid. The oscilloscope remains valid for determining rise/fall times, amplitude, and under and overshoots.

#### 6.8.2 Transmitted eye mask

Figure n describes the transmitted eye masks at the $T_r$ and $C_t$ compliance points. These eye masks apply directly to compliance points, and indirectly to non-compliance reference points.

![Absolute amplitude](image1)

![Normalized amplitude](image2)

**Figure n. Absolute and normalized amplitude eye diagrams at $T_r$ and $C_t$**

For unbalanced drivers the absolute amplitude values assume A.C. coupling between the test load and the driver.

Drivers must meet the normalized and the absolute amplitude requirements. The Y1 and Y2 amplitudes allow signal undershoot and overshoot, respectively, relative to the levels determined to be one and zero.

To accurately determine the one and zero levels for use with the normalized mask, use an oscilloscope having an internal histogram capability. Use the voltage histogram capability and set the time limits of the histogram to extend from 0.4 UI to 0.6 UI. Set the voltage limits of the histogram to include only

---

<table>
<thead>
<tr>
<th>Data rate tolerance at $T_r$, $C_r$ (ppm)</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
<th>±100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data rate tolerance at $T_t$, $C_t$ (ppm)</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
<td>±100</td>
</tr>
<tr>
<td>Media Impedance$^a$ (ohm)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes: $^a$ The media impedances are the differential, or odd mode, impedances.
the data associated with the one level. The one level to be used with the normalized mask shall be the mean of the histogram. Repeat this procedure for the zero level.

The eye diagram mask applies to jitter after application of a single pole high-pass frequency-weighting function that progressively attenuates jitter at 20 dB/decade below a frequency of bit rate/1,667.

6.8.3 Delivered (receive) eye mask

Figure n describes the delivered (received) eye mask. This eye mask applies to jitter after the application of a single pole high-pass frequency-weighting function that progressively attenuates jitter at 20 dB/decade below a frequency of the bit rate/1,667.

Verifying compliance with the limits represented by the received eye mask should be done with reverse channel traffic present in order that the measurement takes the effects of cross talk into account.

6.8.4 Jitter tolerance masks

Tolerance eye masks at T_r and C_r shall be based on Figure n and shall be constructed using the X2, Z1 and Z2 values given in Table n. X1 values shall be half the value for total jitter given in the tables for jitter value frequencies above bit rate/1,667.

The tolerance masks are identical to the output masks except that the X1 and X2 values are each increased by half the amount of the sinusoidal jitter values given in the jitter tolerance tables.

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Receiver Tolerance eye masks at $T_r$ and $C_r$ shall be based on Figure n and shall be constructed using the $X_2$ and $Z_2$ values given in Table n. $X_1$ shall be half the value for total jitter given in these tables for jitter frequencies above bit rate/1 667.

However, the leading and trailing edge slopes of Figure n shall be preserved. As a result the amplitude value of $Z_1$ is less than that given in Table n and must therefore be calculated from those slopes as follows:

\[ Z_{1\text{Tol}} = Z_{1\text{OP}} \times \frac{X_{2\text{OP}} - (0.5 \times \text{additional SJ UI}) - X_{1\text{OP}}}{X_{2\text{OP}} - X_{1\text{OP}}} \]

$Z_{1\text{Tol}}$ is the value for $Z_1$ to be used for the tolerance masks.

$Z_{1\text{OP}}$, $X_{1\text{OP}}$, and $X_{2\text{OP}}$ are the values in Table 18 for $Z_1$, $X_1$, and $X_2$.

The $X_1$ points in the receive tolerance masks are greater than the $X_1$ points in the output masks, again due to the addition of sinusoidal jitter.

Figure n defines the sinusoidal jitter mask.
6.9 Transmitted signal characteristics

6.10 Termination

6.11 Bus timing values

6.12 Timing description

6.13 Measurement points

6.14 Timing parameters

6.15 Setup and hold timings

7 Bus composition

7.1 Bus composition overview

7.2 Connection definition

Table n defines the connections that make up the ADP bus.

<table>
<thead>
<tr>
<th>Connection name</th>
<th>Type</th>
<th>Connection definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention\textsubscript{i}</td>
<td>O</td>
<td>Attention\textsubscript{i} is a signal connection. A target port may use this connection to signal an attention request to the initiator port.</td>
</tr>
</tbody>
</table>
### 7.3 Connection states

<table>
<thead>
<tr>
<th>Connection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reseti</td>
<td>O</td>
</tr>
<tr>
<td>Sensea</td>
<td>O</td>
</tr>
<tr>
<td>Sensei</td>
<td>O</td>
</tr>
<tr>
<td>Tx_i-Rxi</td>
<td>M</td>
</tr>
<tr>
<td>Tx_t-Rxi</td>
<td>M</td>
</tr>
</tbody>
</table>

- **Reseti**: is a signal connection. An initiator port may use this connection to signal a reset request to the target port.
- **Sensea**: is an auxiliary sense connection. This standard does not define the use of this connection.
- **Sensei**: is a sense connection. A target port uses this connection to sense the presence or absence of an initiator port on the ADP bus. When present, the initiator port will source a persistent active signal on this connection.
- **Tx_i-Rxi**: is a Tx-Rx connection. An initiator port uses this connection to send serialized data. Target ports receive serialized data on this connection.
- **Tx_t-Rxi**: is a Tx-Rx connection. Target ports use this connection to send serialized data. Initiator ports receive serialized data on this connection.