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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 n. ADP Compliance points

Compliance point	Type	Description
T_t	intra-enclosure	Target port connector; transmit serial port
T_r	intra-enclosure	Target port connector; receive serial port
C_t	inter-enclosure	External cabinet connector; transmit serial port
C_r	inter-enclosure	External cabinet connector; receive serial port

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 n. Additional ADP reference points

Reference point	Description
I_t	Initiator port connector; transmit serial port
I_r	Initiator port connector; receive serial port

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 signalling.

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.

These specifications are based on ensuring interoperability across multiple vendors supplying the technologies (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 n. Tx-Rx interface characteristics

Characteristic Units	**2,4 kbps**	**4,8 kbps**	**9,6 kbps**	**19,2 kbps**	**38,4 kbps**	**57,6 kbps**	**76,8 kbps**	**115,2 kbps**	**153,6 kbps**
Data rate (bps)	2400	4800	9600	19200	38400	57600	76800	115200	153600
Nominal bit rate (baud)	2400	4800	9600	19200	38400	57600	76800	115200	153600
Unit interval	416667 (ns)	208333 (ns)	104167 (ns)	52083 (ns)	26041667 (ps)	17361111 (ps)	13020833 (ps)	8680556 (ps)	6510417 (ps)

Data rate tolerance at T_r, C_r (ppm)	±100	±100	±100	±100	±100	±100	±100	±100	±100
Data rate tolerance at T_t, C_t (ppm)	±100	±100	±100	±100	±100	±100	±100	±100	±100
Media Impedance[a] (ohm)	100	100	100	100	100	100	100	100	100

Notes: a The media impedances are the differential, or odd mode, impedances.

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 +/-7 σ. Current oscilloscope technology only supports approximately +/-3 σ, 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_t, and C_t compliance points. These eye masks apply directly to compliance points, and indirectly to non-compliance reference points.

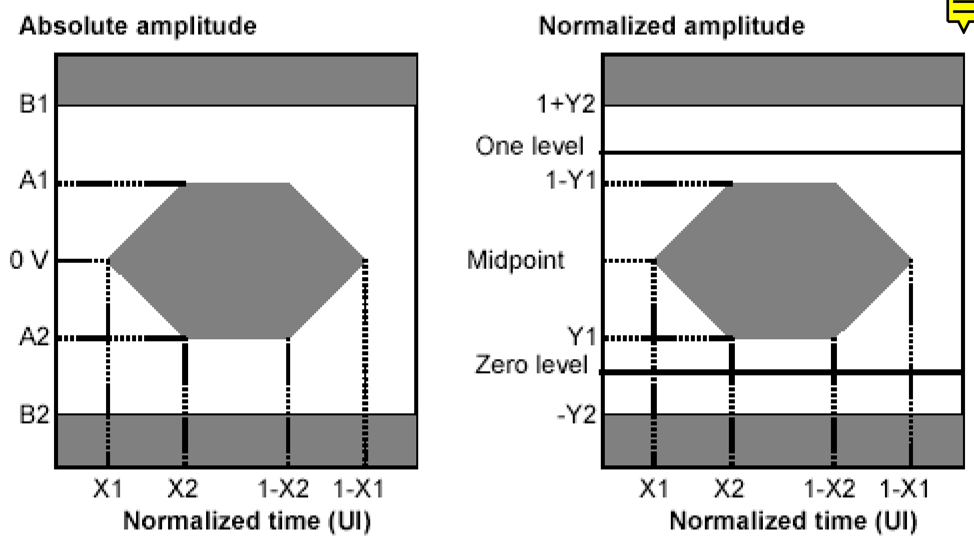

Figure n. Absolute and normalized amplitude eye diagrams at T_t and C_t

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 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.

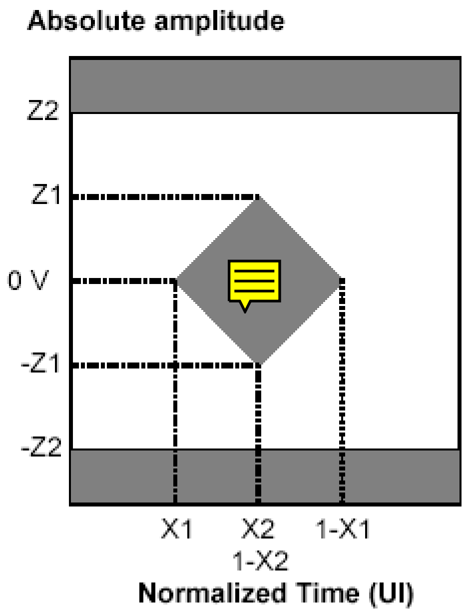

Figure n. Eye mask at T_r and C_r

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_t and C_t 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.

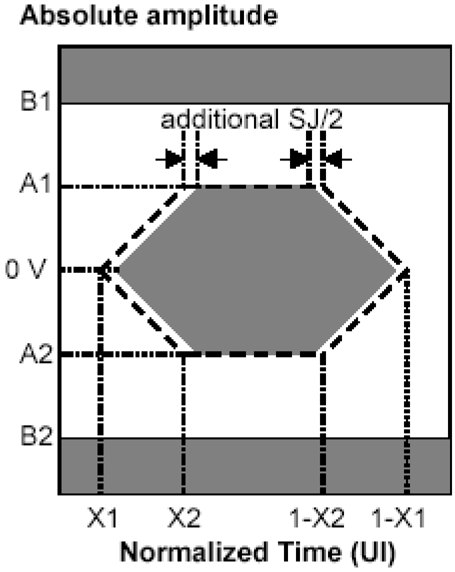

Figure n. Deriving a tolerance mask at T_t and C_t

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

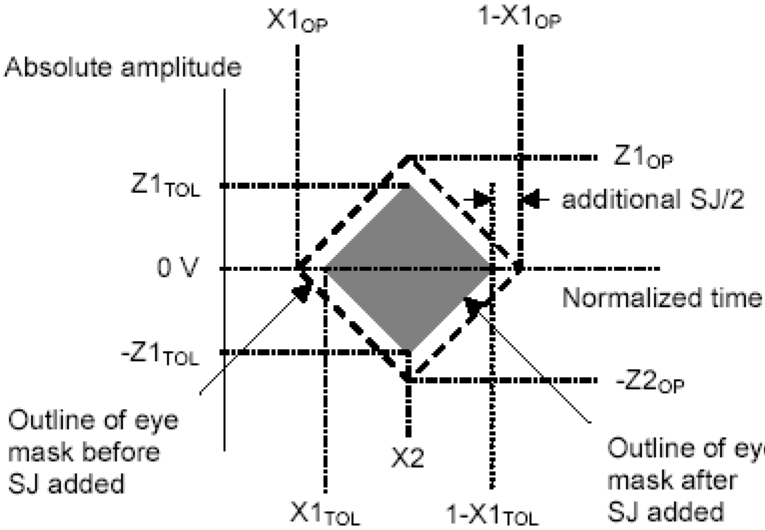

Figure n. Deriving a tolerance mask at T_r and C_r

However, the leading and trailing edge slopes of Figure n shall be preserved. As a result the amplitude value of Z1 is less than that given in Table n and must therefore be calculated from those slopes as follows:

$Z1_{Tol} = Z1_{OP}$ x ($X2_{OP}$ – (0,5 x (additional SJ UI)) - $X1_{OP}$)/($X2_{OP}$ -$X1_{OP}$)
$Z1_{Tol}$ = value for Z1 to be used for the tolerance masks
$Z1_{OP}$, $X1_{OP}$, and $X2_{OP}$ are the values in Table 18 for Z1, X1, and X2

The X1 points in the receive tolerance masks are greater than the X1 points in the output masks, again due to the addition of sinusoidal jitter.

Figure n defines the sinusoidal jitter mask.

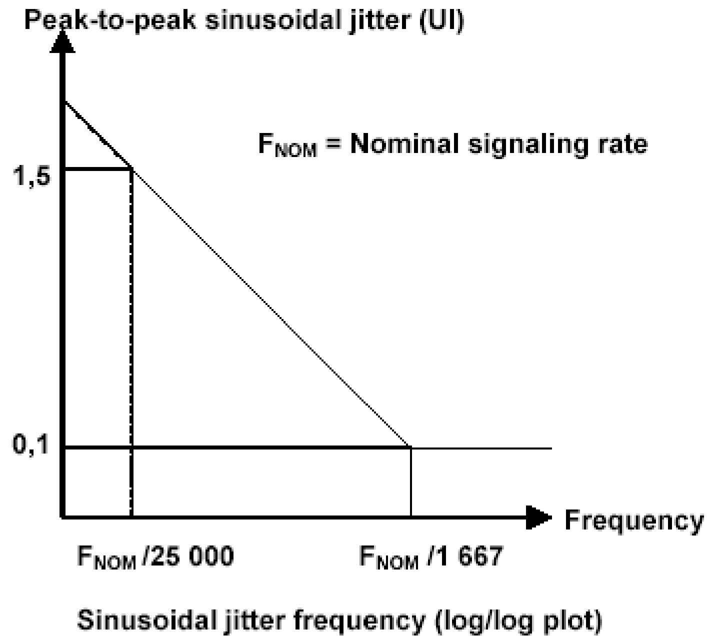

Figure n. Sinusoidal jitter mask

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 n – ADP bus connections

Connection name	Type	Connection definition
$Attention_i$	O	$Attention_i$ is a signal connection. A target port may use this connection to signal an attention request to the initiator port.

$Reset_t$	O	$Reset_t$ is a signal connection. An initiator port may use this connection to signal a reset request to the target port.
$Sense_a$	O	$Sense_a$ is an auxiliary sense connection. This standard does not define the use of this connection.
$Sense_i$	O	$Sense_i$ 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-Rx_t	M	Tx_i-Rx_t is a Tx-Rx connection. An initiator ports uses this connection to send serialized data. Target ports receive serialized data on this connection.
Tx_t-Rx_i	M	Tx_t-Rx_i is a Tx-Rx connection. Target ports use this connection to send serialized data. Initiator ports receive serialized data on this connection.

7.3 Connection states