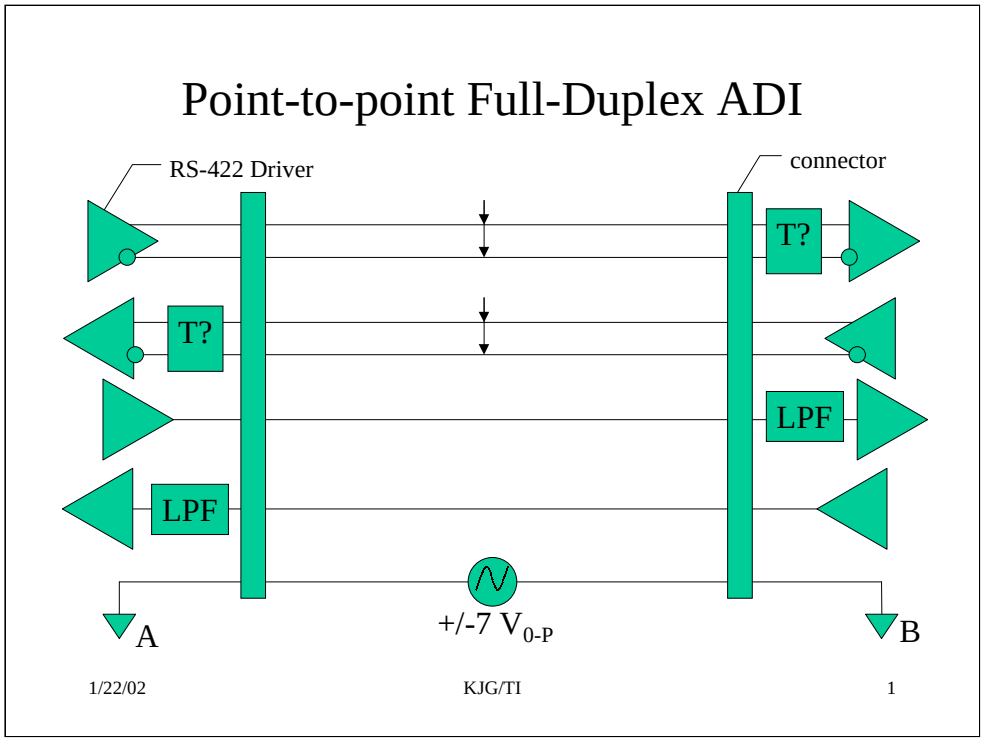

A low impedance line termination is optional if the distance and driver output transition times are bounded.

Assuming the RS-422 common-mode range is necessary, use of single-ended lines will not work if steady-state noise is permitted. Some minimum frequency content of noise must be assumed to allow low-pass filtering at the single-ended receiver inputs. Seven volts of noise at 60 Hz would require 27 dB of attenuation and may be costly. If not, use of RS-422 on all signals is required.

The arrows on the differential pair indicate twisting of the wires.

Point-to-point Electrical Specifications

Parameter	Test Conditions	LSL	USL	units
Differential outputs	TIA/EIA-422-B and as below			
tr, 10%-to-90% output rise time	RL= 100 ohms, CL= 10 pF	0.4	1.2	us
tf, 90%-to-10% output fall time	RL= 100 ohms, CL= 10 pF	0.4	1.2	us
Differential inputs	TIA/EIA-422-B and as below			
RIN, Differential input resistance		95		ohms
VI(OS), Input offset voltage	RL= 100 kohm	200	6xRIN	mV
Single-ended outputs				
VOH, High-level output voltage	RL= 50 kohm, VL= -7 V	2.3	5.5	V
VOL, Low-level output voltage	RL= 50 kohm, VL= 7 V	0	0.5	V
tr, 10%-to-90% output rise time	RL= 50 kohms, CL= 400 pF		1000	us
tf, 90%-to-10% output fall time	RL= 50 kohms, CL= 400 pF		1000	us
Single-ended inputs				
VIH, high-level input voltage		2		V
VIL, low-level input voltage			0.8	V
VI(OS), Input offset voltage	RL= 1 Mohm	2	5.5	V
RIN, input resistance		50		kohm
Vn, input noise voltage	sinusoid, f= 60 Hz	-7	7	V

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Assumptions are

- maximum length of 20 feet
- low capacitance cable of approximately 20 pF/ft
- a propagation velocity of 1.5 ns/ft
- open-circuit inputs default to a high level
- signaling rate on single-ended lines is less than 300 bps
- signaling rate on differential lines is less than 256 kbps
- 3.3-V and 5-V +/-10% supplied circuits

Constraints/Other Specifications

- Logic convention (high level = true?)
- Signal quality
  - TIA/EIA-404-B Standard for Start-Stop Signal Quality for Non-Synchronous Data Terminal Equipment
    - category?
    - exceptions?
  - Non-standard (single-ended) lines
    - signaling rate?
    - monotonic?
- Failsafe provisions (Open or shorted lines?)
- Input noise response?
- Grounding
  - shields
  - signal returns
  - earth connection
- Connector and contact assignments
- Multipoint allowed?

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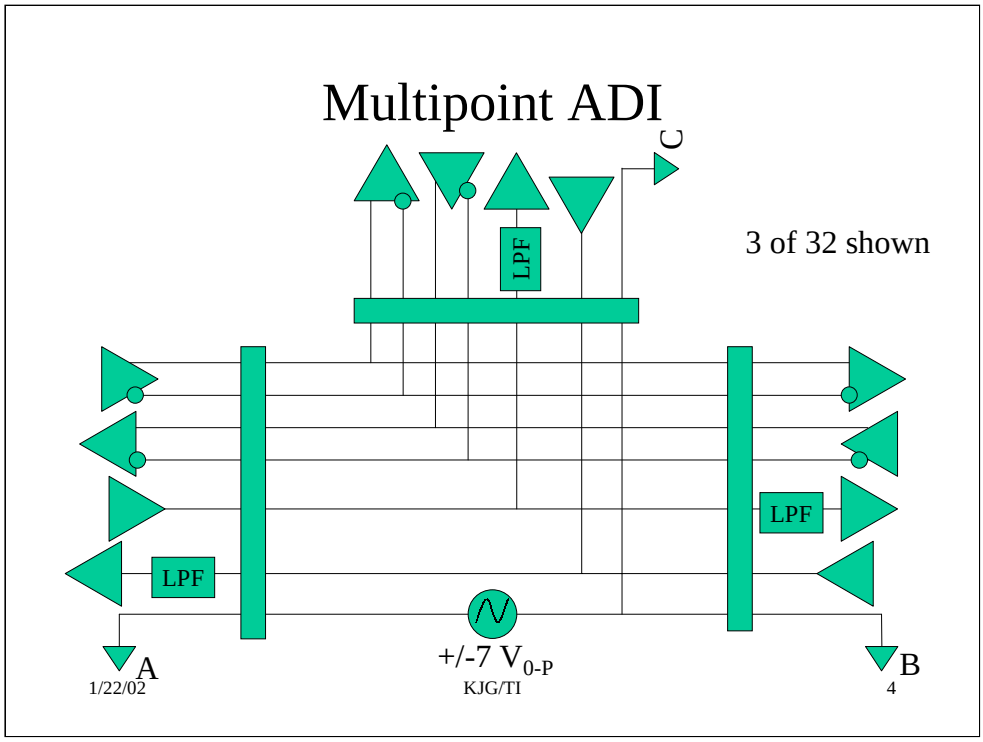
For the sender, 404 specifies the quality of binary data signals employing start-stop (asynchronous) format at a data terminal equipment interface. There are different categories provided with different spec limits. Exceptions to the interface measurement requirements may be warranted for ADI.

Will the single-ended lines be allowed to bounce or oscillate during transition? If so, for how long?

What should the default state be for open inputs? How should the equipment respond?

If the cable is to carry signal return or is shielded, how should it be terminated to prevent ground loops?

If multipoint connection is to be allowed, the electrical requirements change.


Multipoint ADI
C
LPF
3 of 32 shown
LPF
LPF
A
+/-7 V0-P
B
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Multipoint Electrical Specifications

Parameter	Test Conditions	LSL	USL	units
Differential outputs	TIA/EIA-485-B and as below			
tr, 10%-to-90% output rise time	RL= 60 ohms, CL= 10 pF	0.4	1.2	us
tf, 90%-to-10% output fall time	RL= 60 ohms, CL= 10 pF	0.4	1.2	us
Differential inputs	TIA/EIA-485-B and as below			
RIN, Differential input resistance		12		kohms
VI(OS), Input offset voltage	RL= 375 ohm	200	0.09xRIN	mV
Single-ended outputs				
VOH, High-level output voltage	RL= 1.56 kohm, VL= -7 V	2.3	5.5	V
VOL, Low-level output voltage	RL= 1.56 kohm, VL= 7 V	0	0.5	V
tr, 10%-to-90% output rise time	RL= 1.56 kohms, CL= 720 pF		1000	us
tf, 90%-to-10% output fall time	RL= 1.56 kohms, CL= 720 pF		1000	us
Single-ended inputs				
VIH, high-level input voltage		2		V
VIL, low-level input voltage			0.8	V
VI(OS), Input offset voltage	RL= 30 kohm	2	5.5	V
RIN, input resistance		50		kohm
Vn, input noise voltage	sinusoid, f= 60 Hz	-7	7	V

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Additional assumptions

- the complexity of managing line termination is not desired
- maximum of 32 connections to a bus segment
- 10 pF of capacitance added per connection