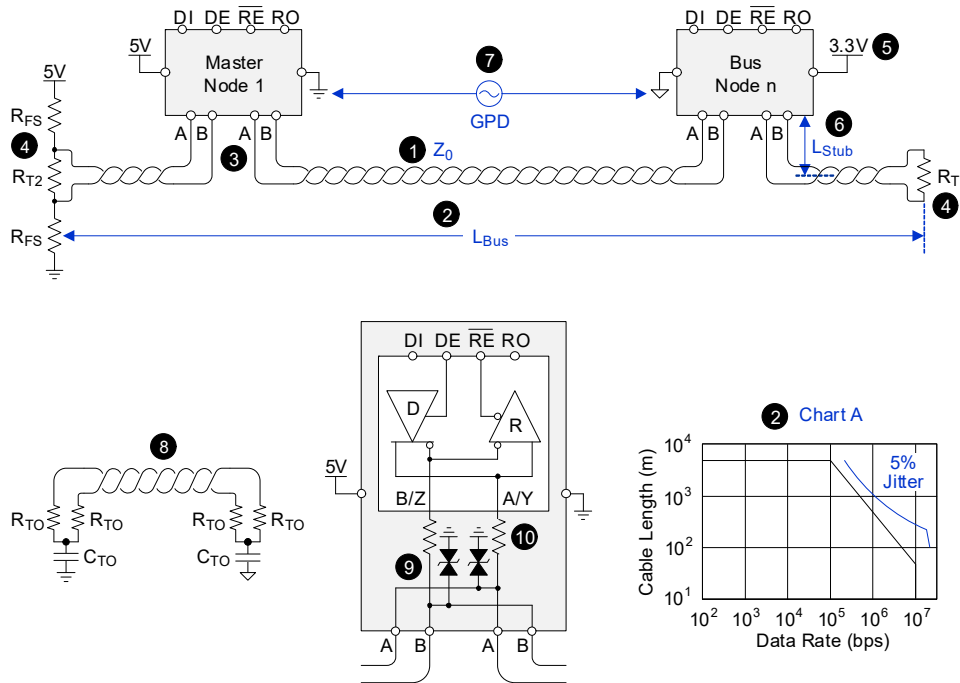


RS-485 Design Tips

This tutorial provides recommendations for quickly starting the design process with compatible RS-485 devices.



Ten Best Design Tips

Note: Each tip is referenced in the diagram by number.

- Use the twisted-pair cable with the following: $Z_0 = 120\Omega$ or 100Ω
- Determine maximum cable length, L_{BUS} , with Chart A.
- Connect the bus nodes with the Daisy-chain.
- Terminate one cable end with the following: $R_{T1} = Z_0$
Apply the failsafe biasing to the other end with the following:

$$R_{FS} = \left(\frac{V_{CC-min} + 1}{V_{AB-idle}} \right) \cdot k$$

$$k = 27.8\Omega \text{ for } Z_0 = 120\Omega$$

$$k = 23.4\Omega \text{ for } Z_0 = 100\Omega$$

Terminate this end with the following:

$$R_{FS} = \frac{R_{FS} \cdot Z_0}{R_{FS} - Z_0}$$

$$L_{Stub} < 3 \cdot 10^{-4} \cdot t_r \cdot v$$

L_{Stub} = stub length (m)
 t_r = driver rise time (ns)
 v = signal velocity in cable (%)

- For $GPD = \pm 7$, use ISL315xE or RAA78815x
For $GPD > \pm 15V$, use ISL324xx
For higher GPDs, use ISL31xxE + optocouplers
- Terminate unused conductors with the following:
 $R_{TO} = Z_0/2$ and $C_{TO} = 1\mu F$
- For ESD, EFT, and Surge protection:
Use SM712 or read AN1976, AN1977, AN1978, and AN1979.
- Limit transient current into the transceiver with the following:
20 Ω carbon-composite or MELF resistors

Revision History

Revision	Date	Description
1.00	Nov 8, 2023	Initial release.

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