25 Spring ECEN 720: High-Speed Links: Circuits and Systems Pre-lab Report

Lab1: Transmission Lines

Name: Yu-Hao Chen

UIN:435009528

Section:700

Professor: Sam Palermo

TA: Srujan Kumar Kaile

Pre-Lab:

1. Please work out the waveforms using Lattice Diagram for the terminated transmission line as shown in Figure 8. Assuming the delay time of the transmission line is 2ns and the input source is 1V step with 1ns delay. R_S=100Ω, R_T=30Ω, and Z_0=50Ω

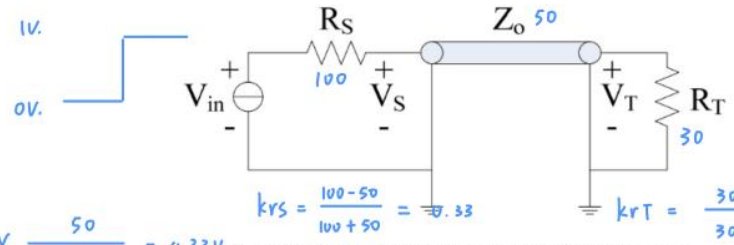
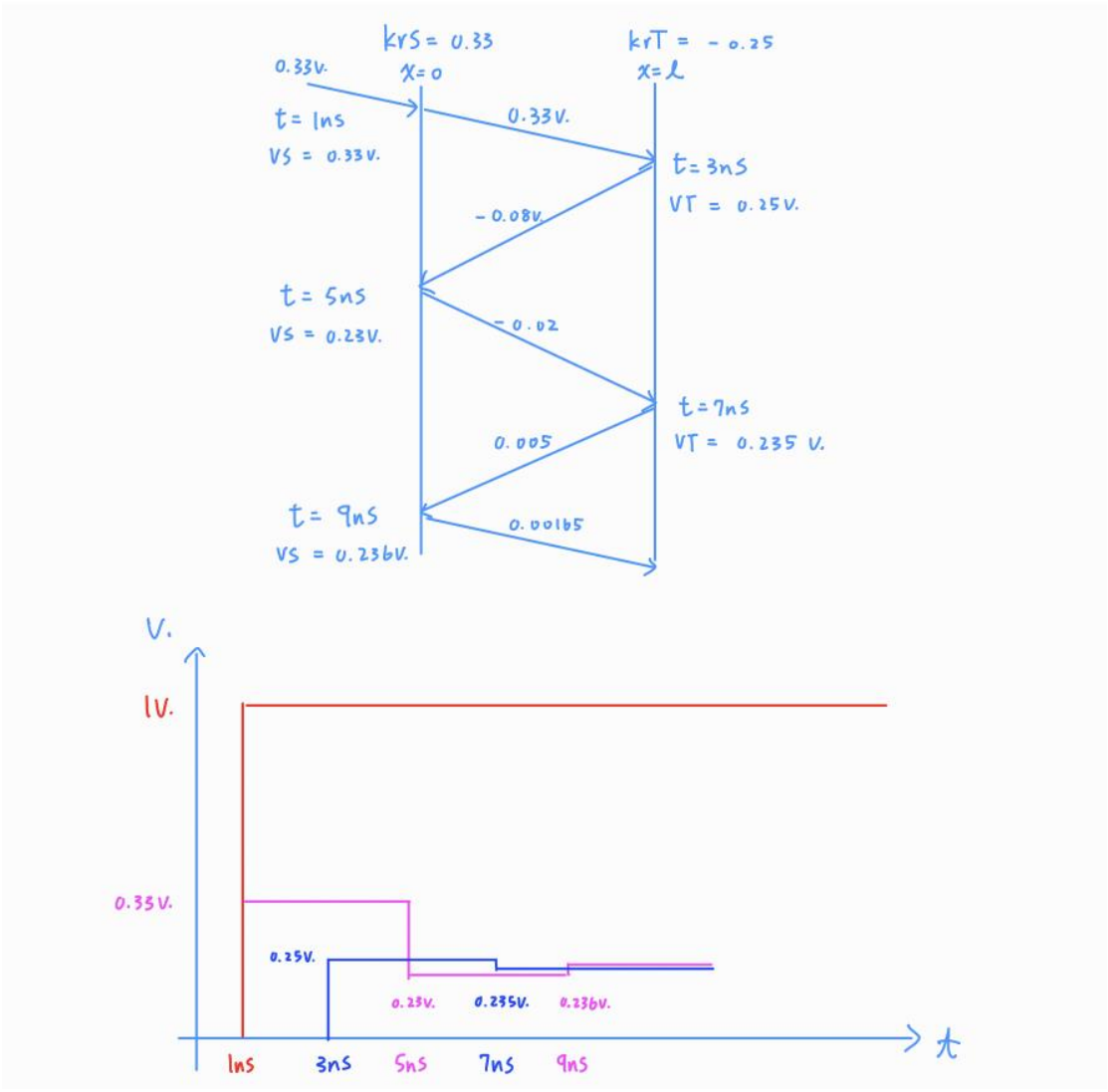


Figure 8 Transmission Line Termination Example



2. Please comment on the pros and cons of source termination and receiver termination schemes as shown in Figure 9.

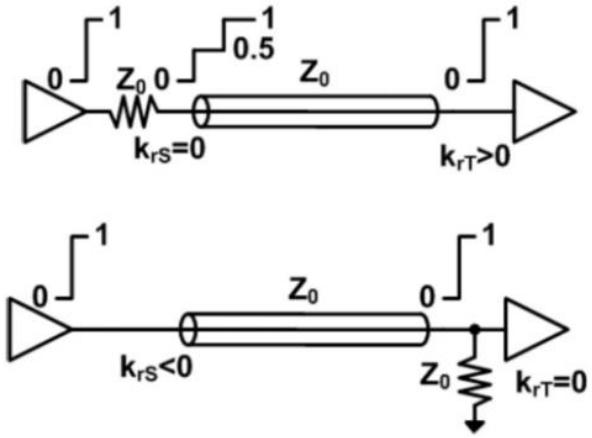


Figure 9 Source and Receiver Termination Schemes

1. Source Termination (Top)
   - Pros

     Power Efficient – No constant power dissipation at the receiver since there is no termination resistor at the end.

     Reduced Component Count at Receiver – No termination resistor at the receiver reduces board complexity.
   - Cons

     Requires Time to Settle – The signal at the receiver initially has a reflection, and only after a round trip (source to receiver and back to source) does it stabilize. This can be problematic in high-speed circuits.

     Not Suitable for Multi-Drop Buses – In multi-receiver configurations, the reflections will not be effectively absorbed at the source.
2. Receiver Termination (Bottom)
   - Pros

     Faster Signal Propagation – The signal at the receiver does not require additional time to stabilize, making it **better suited for high-speed applications**.

     No Round-Trip Delay – Since the signal is immediately absorbed at the receiver, there are no lingering reflections affecting signal integrity.
   - **Cons**

     Power Dissipation at Receiver – The termination resistor constantly consumes power, which may be an issue in low-power designs.

     Potential Source Reflection – If the source does not match the transmission line (krs<0), some energy might be reflected back, potentially causing secondary reflections.