Curriculum Topic :
Time-Domain Transmission Lines

TDT4 : Termination Schemes

Module Outline:	
Prerequisite Skills	Competencies
Supplemental Reading and Resources	Assessments
Laboratory Activities	Power Point Slides and Notes

Prerequisite Skills

Prerequisites / Requirements:
TDT3 Transmission Line Equations

Competencies

Competency TDT.4: Understanding termination schemes for switched transmission lines.

Competency Builders:
TDT.4.1 List the basic types of transmission line matching schemes for DC-switched signals.
TDT.4.2 Understand the trade-offs between cost, complexity, and power consumption in the various termination schemes.
TDT.4.3 Design a termination scheme for an arbitrary transmission line connection.

Supplemental Reading and Resources

Supplemental Reading Materials:

A.F. Peterson and G.D. Durgin. *Transient Signals on Transmission Lines: An Introduction to the Non-Ideal Effects and Signal Integrity Issues in Electrical Systems*. Morgan & Claypool Publishers, 2009. Chapter 4.

Assessments

The following questions and exercises may serve as either pre-assessment or post-assessment tests to evaluate student knowledge.

Question: TDT4.1 *Competency:* TDT.4.1

Name 4 types of termination schemes studied in the course.

Answer:

Series match, parallel match, capacitor match, diode match

Question: TDT4.2 *Competency:* TDT.4.2

Under what scenario might a parallel match be preferred to a capacitor match? Under what scenario might a capacitor match be preferred to a parallel match?

Answer:

The capacitor match is preferred with power consumption and dissipation is an issue, since the parallel match uses extra resistance – and, hence, extra power dissipation – to suppress reflections. The resistive parallel match may be preferred whenever a transmission line is driving a high-impedance load and the duration of the switched DC signals or pulses are unknown (since the capacitor selection in the capacitor match will make the signals time-constant dependent).

Question: TDT4.3 *Competency:* TDT.4.3

A 50-Ω transmission line drives a 500-Ω logic load and is itself driven by a 25-Ω logic output source. What would the source-side series matching resistor value be for this circuit? What would the load-side parallel matching resistor be for this circuit?

Answer:

The series match would require a 25-Ω resistor. The parallel match would require a 56-Ω resistor.