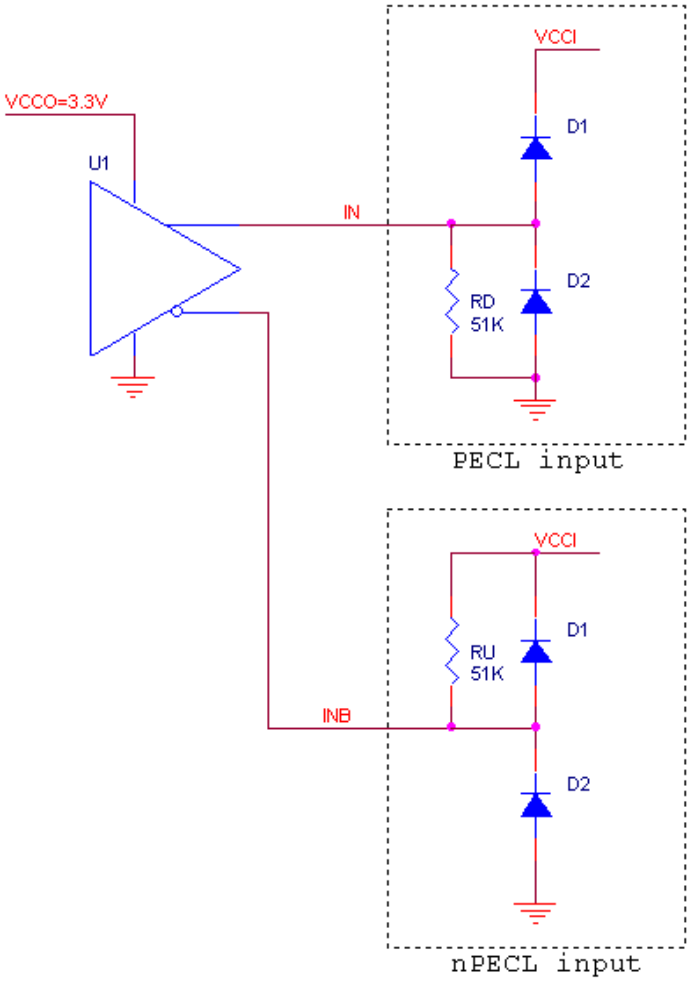
Introduction

Hot-swap is a term used to refer to the insertion and removal of a daughter card from a backplane without powering down the system power. With today's high speed data and redundancy requirements, many systems are required to run continuously without being powered down. If special considerations are not taken, the device can be damaged.

Typical Differential Clock Input

For example, Figure 1 shows a typical LVPECL driver and differential input. If the power of the driver (VCCO) is turned on before the input supply (VCCI), there is a possibility that the input current could exceed the limit and damage diode D1.

Figure 1. Typical Differential Clock Input (termination not shown)



To ensure the input current does not exceed its limit and damage the device, a current limiting resistor can be used. Below are examples of the most common termination topologies using a series current limiting resistor. Though it's not necessary, but if board space allows, some of the examples have an optional 100pf capacitor which assists with the integrity of the rise time. It is also recommended that the current limiting resistor be as close to the receiver as possible.

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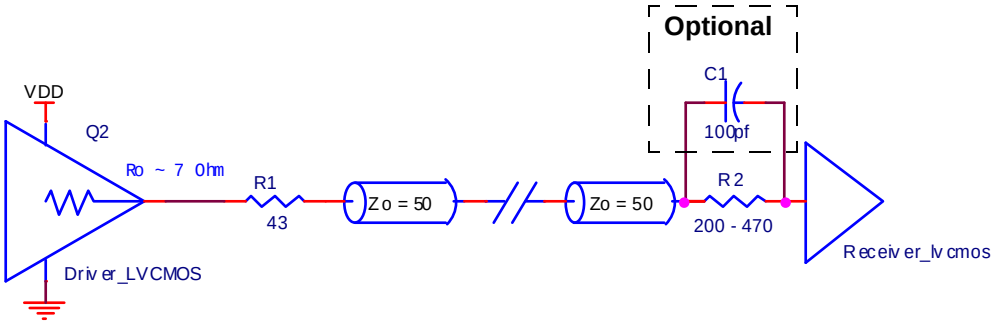
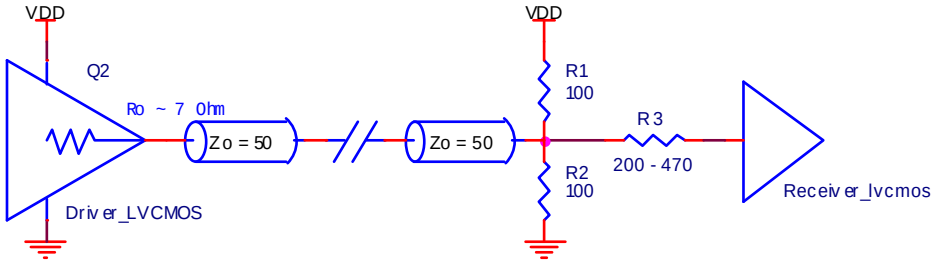
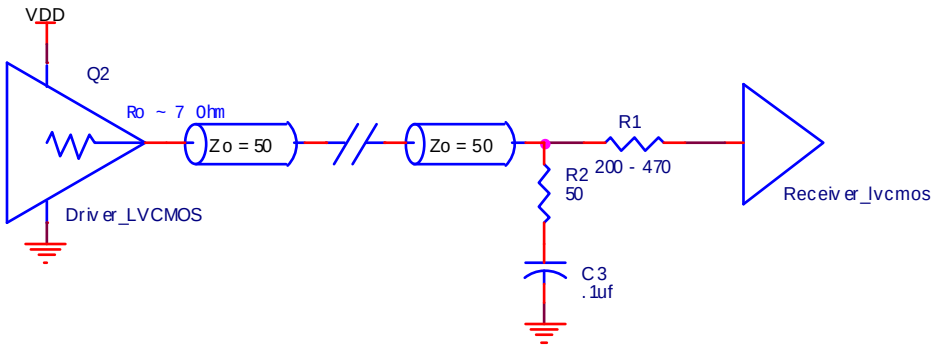
LVCMOS Termination Examples







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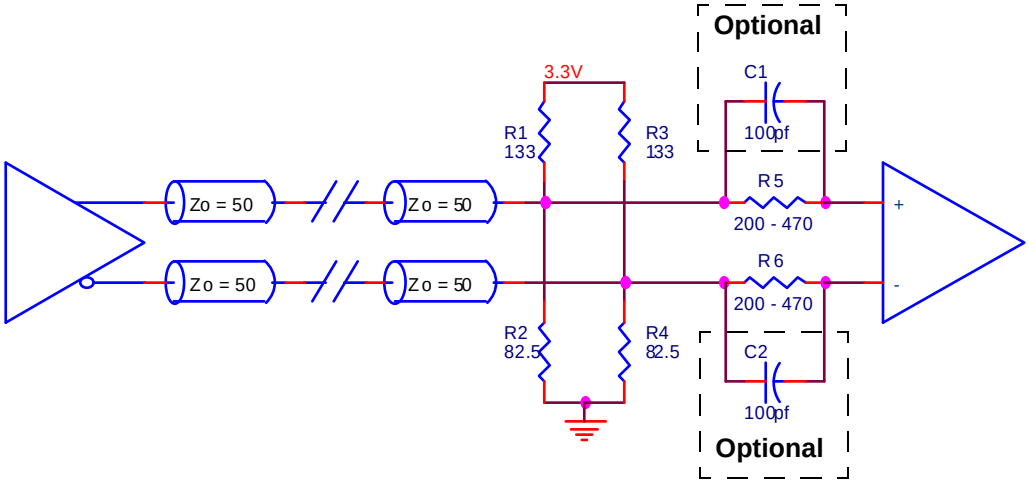
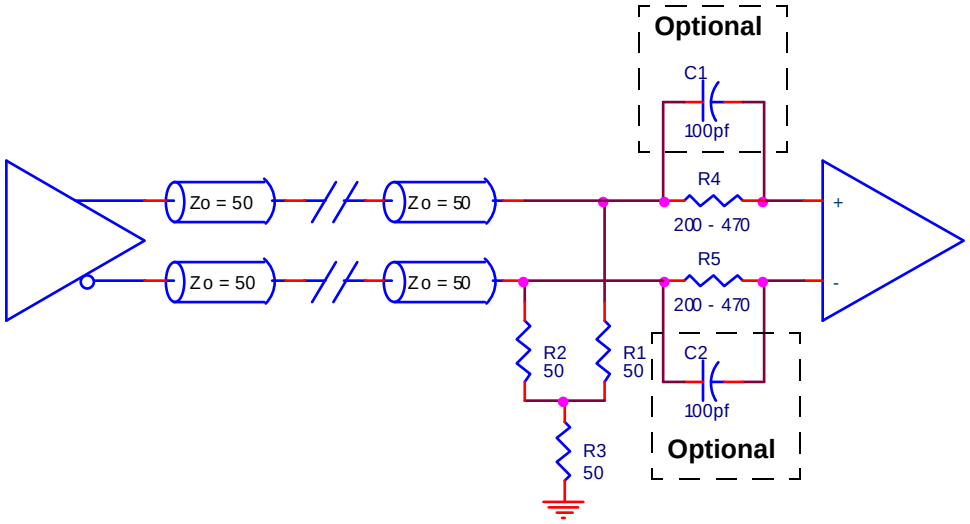
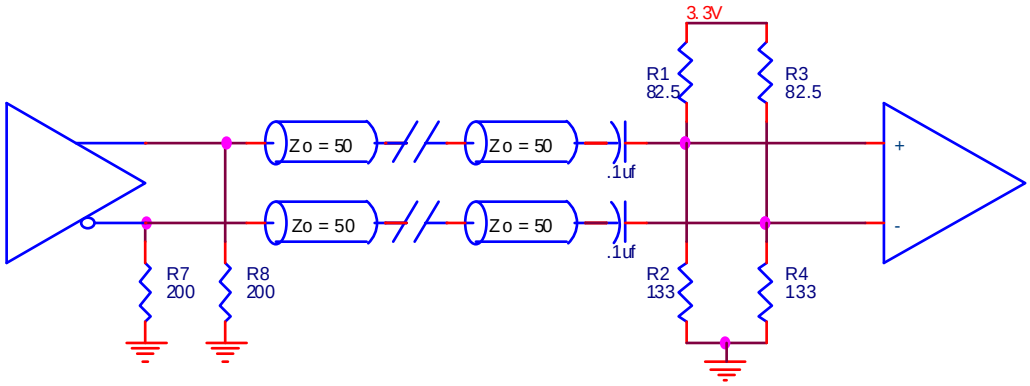
LVPECL Termination Examples







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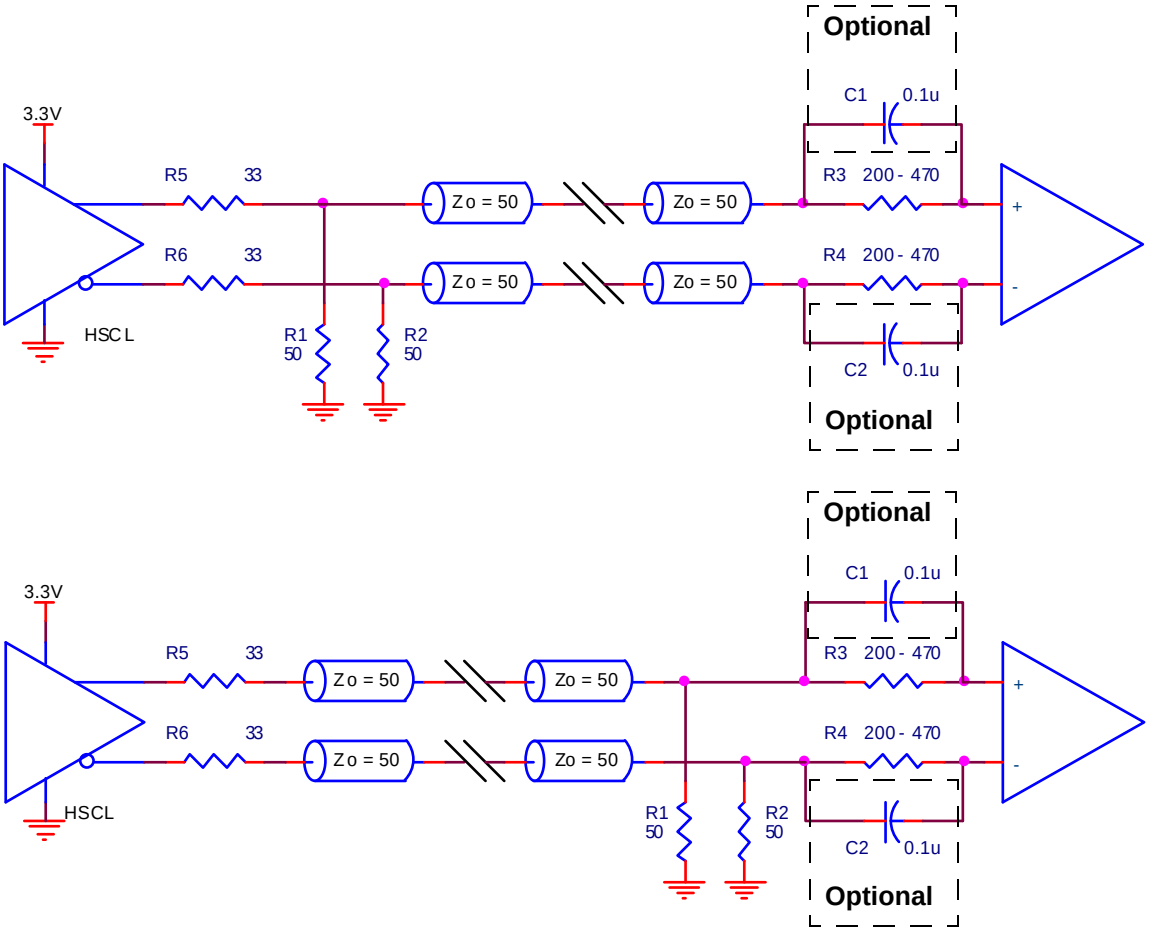
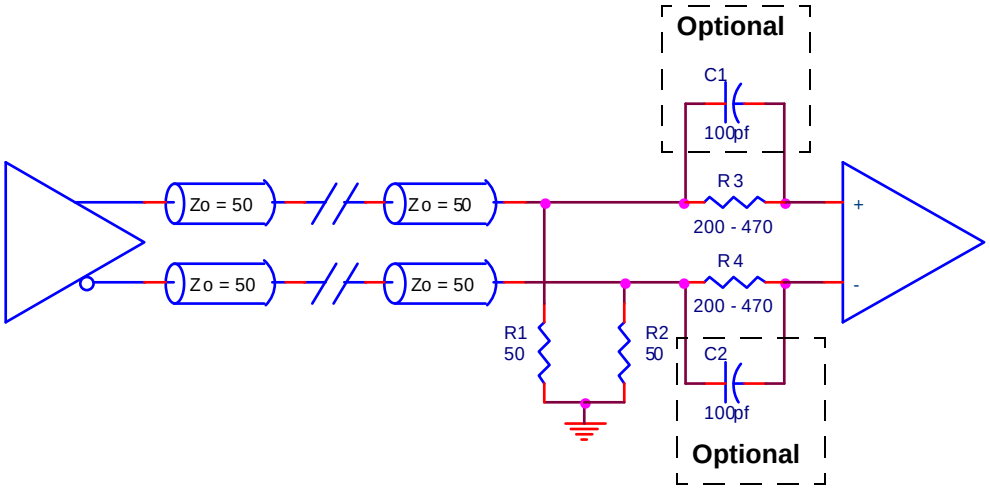
HCSL / PCI Express Termination Examples



HSTL Termination Example



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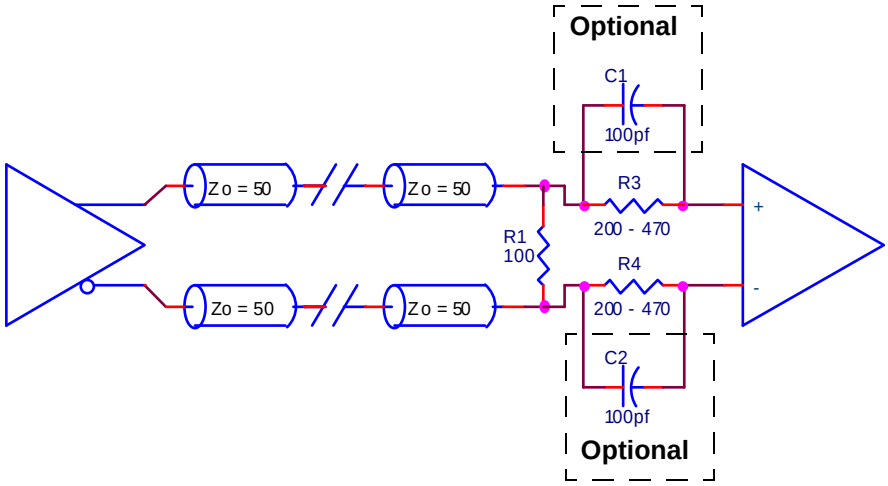
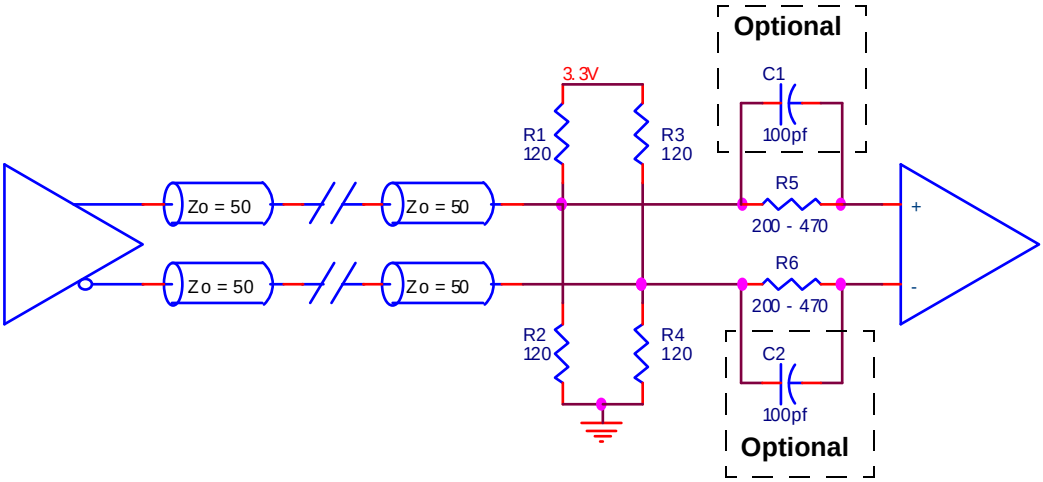
LVDS Termination Example



SSTL Termination Example



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