

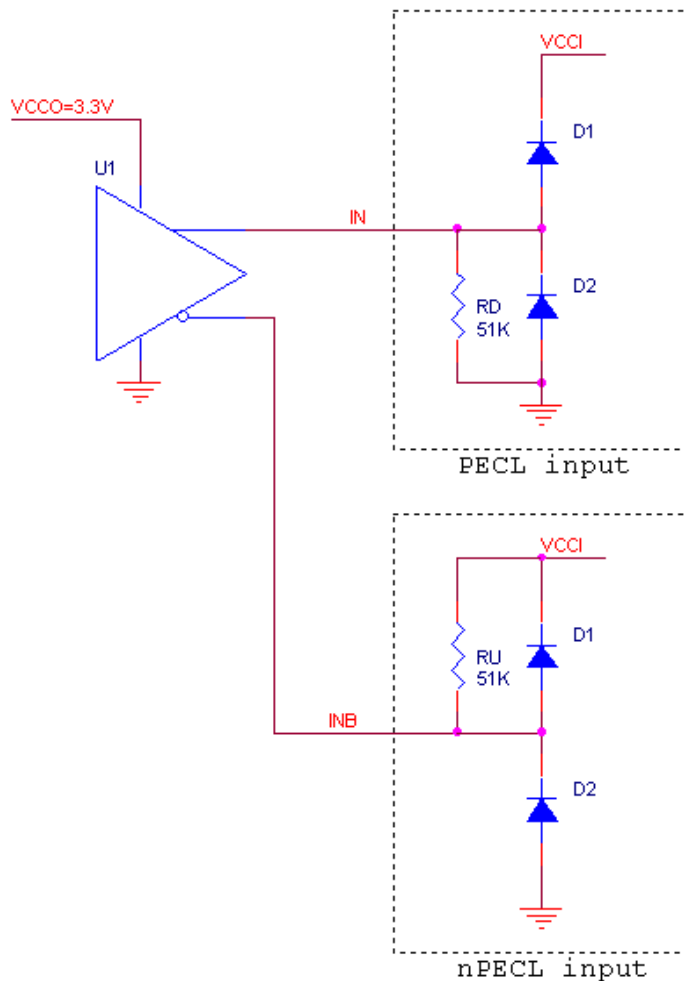
Introduction

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

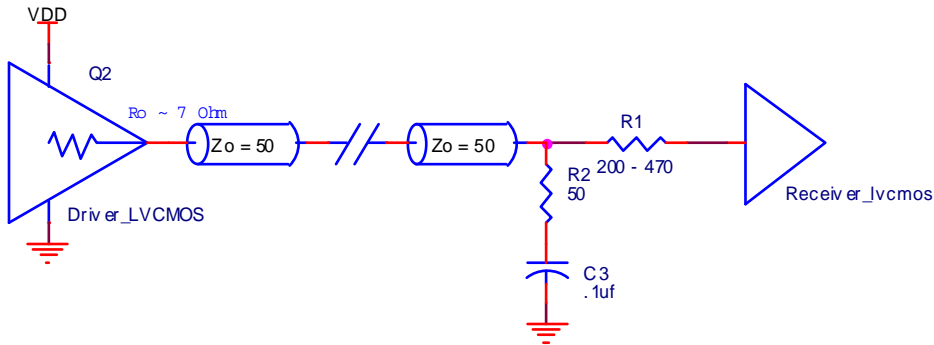
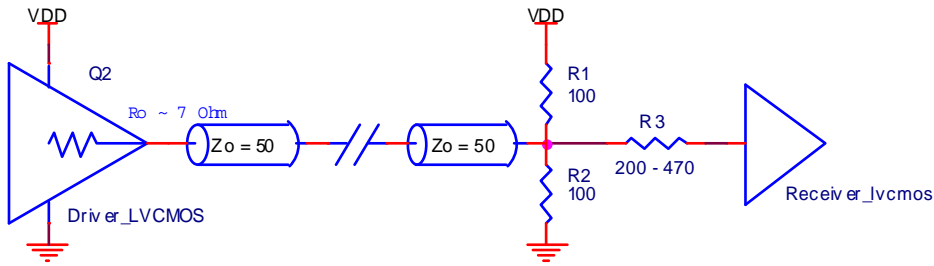
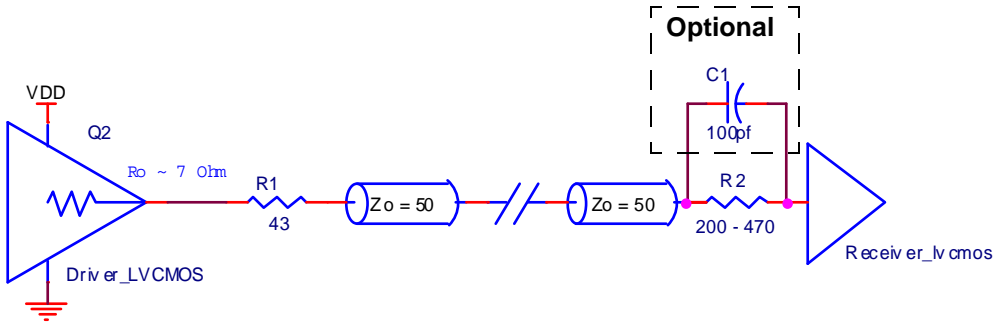
For example, [Figure 1](#) shows a typical LVPECL driver and differential input. If the power of the driver (VCCO) is turned on before the input supply (VCCI), there is a possibility that the input current could exceed the limit and damage diode D1.

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

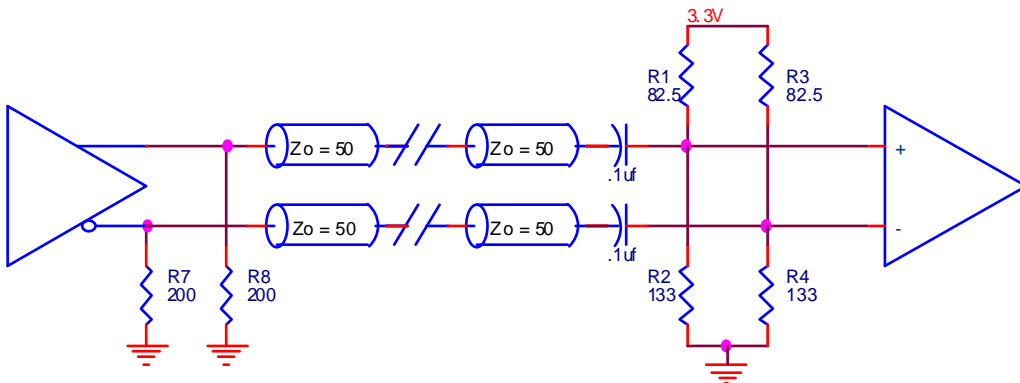
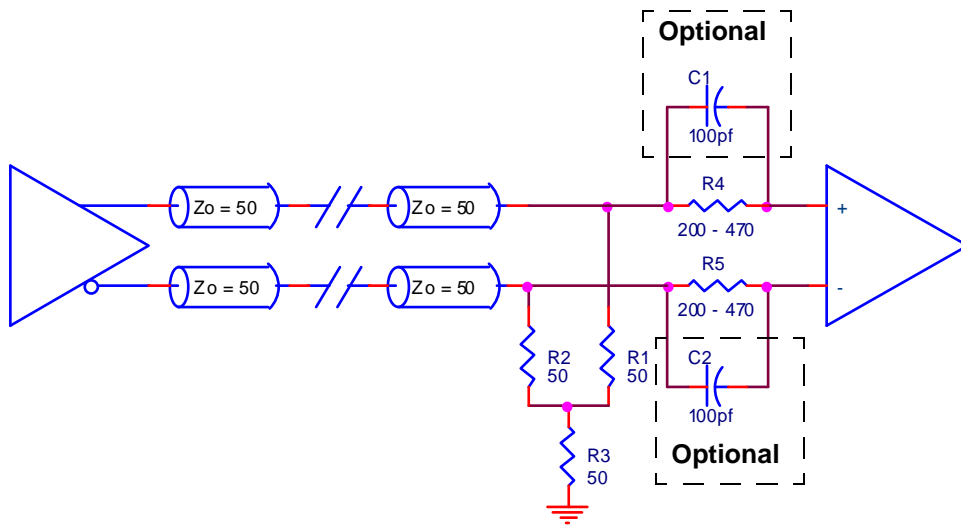
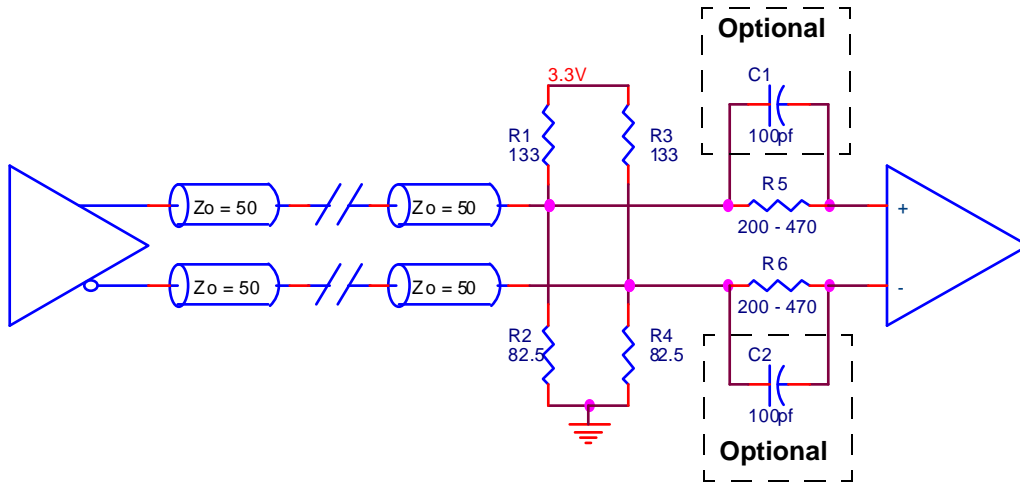


To ensure the input current does not exceed its limit and damage the device, a current limiting resistor can be used. Below are examples of the most common termination topologies using a series current limiting resistor. Though it's not necessary, but if board space allows, some of the examples have 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.

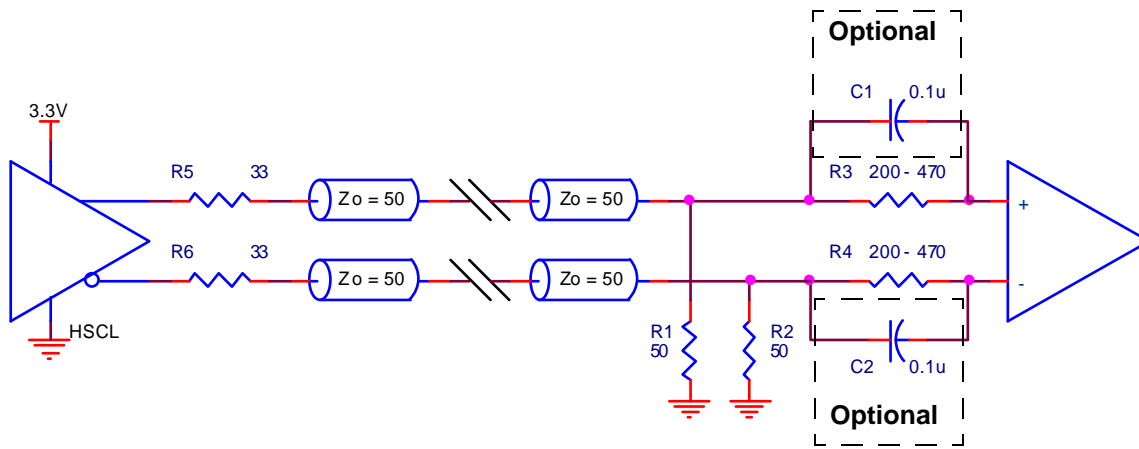
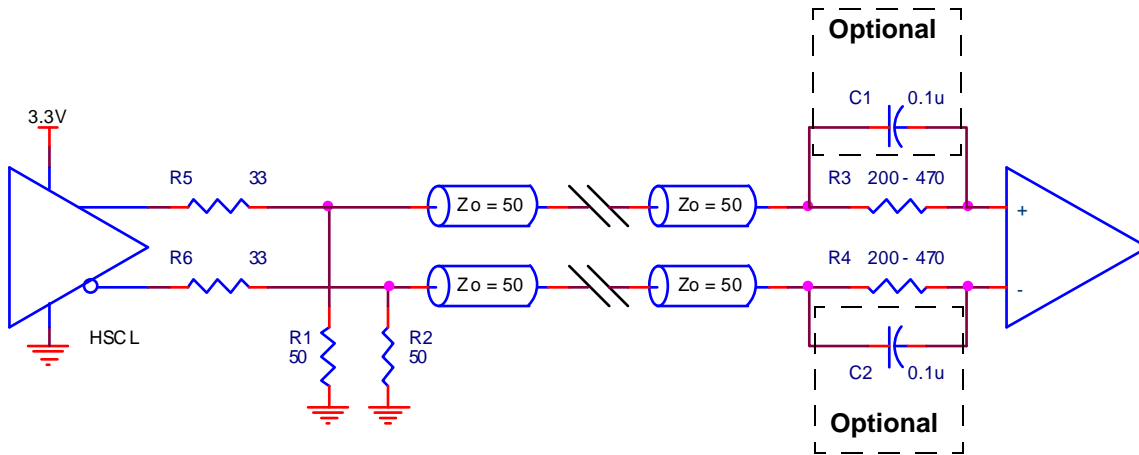
LVC MOS Termination Examples



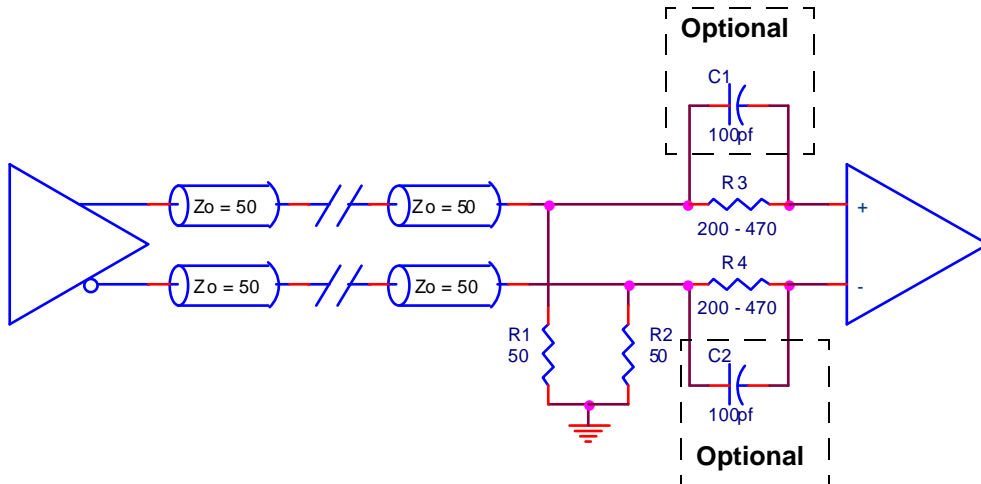
LVPECL Termination Examples



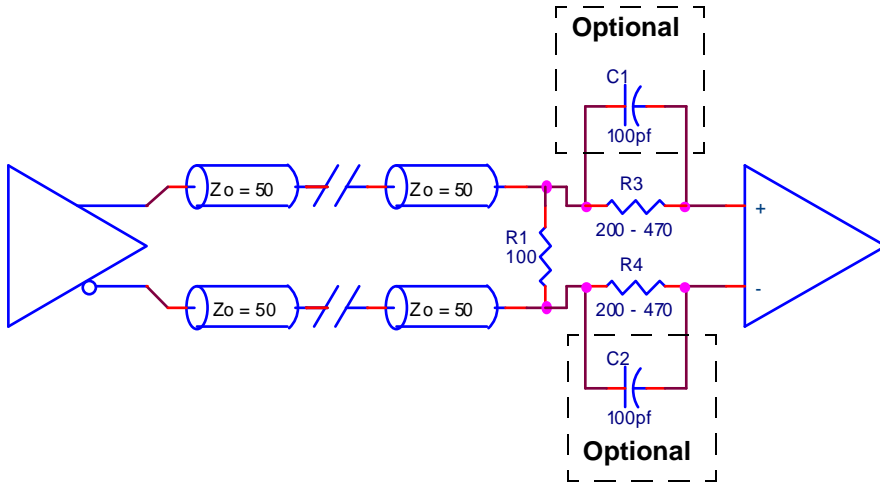
HCSL / PCI Express Termination Examples



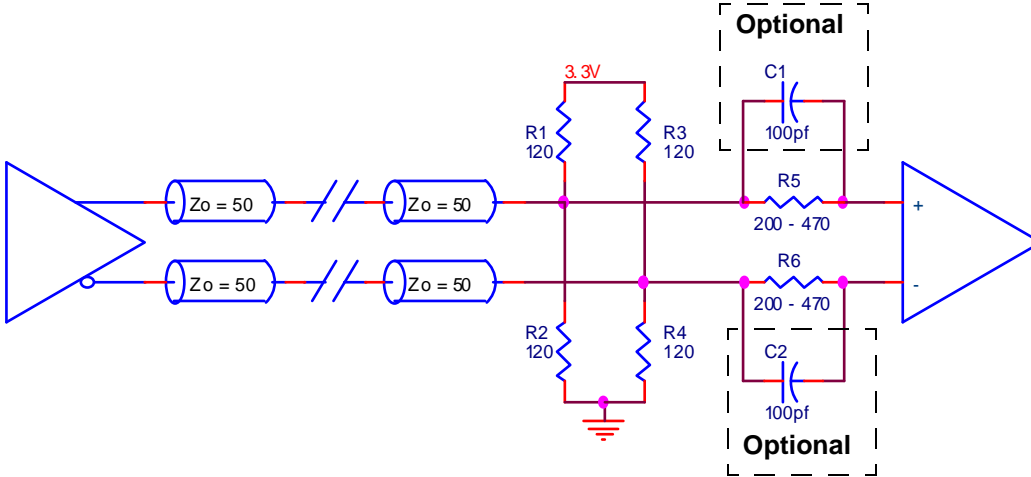
HSTL Termination Example



LVDS Termination Example



SSTL Termination Example



IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers skilled in the art designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only for development of an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising out of your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Rev.1.0 Mar 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.