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HD3SS3412
Application Note

Abstract

The HD3SS3412 is a high-speed passive switch capable of switching four differential channels, including applications such as two full PCI Express x1 lanes from one source to one of two target locations in a PC/server application. With its bidirectional capability the HD3SS3412 will also support applications that allow connections between one target and two source devices, such as a shared peripheral between two platforms. The HD3SS3412 has a single control line (SEL Pin) which can be used to control the signal path between Port A and either Port B or Port C. This application note provides information on typical implementation of the HD3SS3412 device.

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Introduction

The HD3SS3412 is a generic 4-CH high speed mux/demux type of switch that can be used for routing highspeed signals between two different locations on a circuit board. Although it was designed specifically to address PCI Express Gen III applications, the HD3SS3412 will also support several other high-speed data protocols with a differential amplitude of <1800mVpp and a common mode voltage of <2.0V, as with USB 3.0 and DisplayPort 1.2. The device's one select input (SEL) pin can easily be controlled by an available GPIO pin within a system or from a micro-controller.

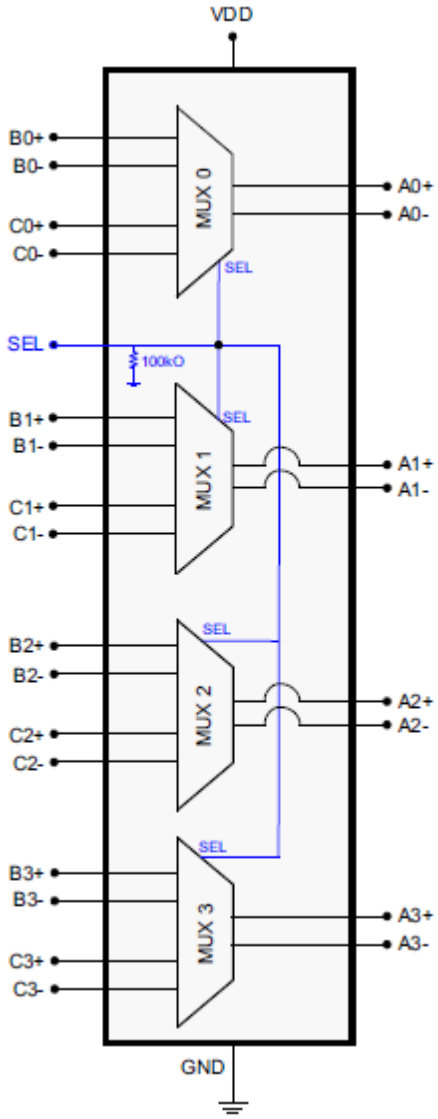

Figure 1 HD3SS3412 Functional Diagram

AC Coupling Caps

Many interfaces require AC coupling between the transmitter and receiver. The 0402 capacitors are the preferred option to provide AC coupling, and the 0603 size capacitors will also work. The 0805 size capacitors and C-packs should be avoided. When placing AC coupling capacitors symmetric placement is best. A capacitor value of 0.1uF is best and the value should be match for the +/- signal pair. The placement should be along the TX pairs on the system board, which are usually routed on the top layer of the board.

There are several placement options for the AC coupling capacitors. Because the switch requires a bias voltage, the capacitors must only be placed on one side of the switch. If they are placed on both sides of the switch, a biasing voltage should be provided. A few placement options are shown below. In Figure 2, the coupling capacitors are placed between the switch and endpoint. In this situation the switch is biased by the system/host controller.

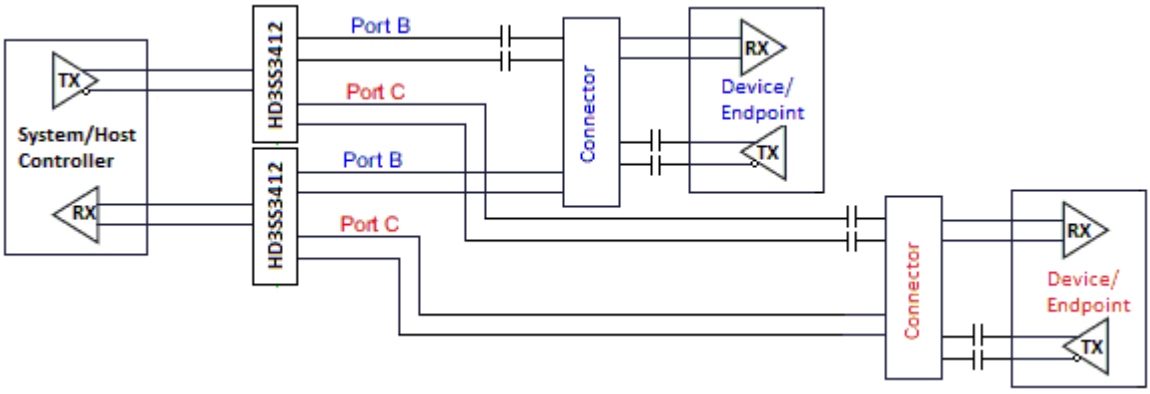

Figure 2 AC Coupling Capacitors Between Switch TX and Endpoint TX

In Figure 3, the coupling capacitors are placed on the host transmit pair and endpoint transmit pair. In this situation the switch on the top is biased by the endpoint and the lower switch is biased by the host controller.

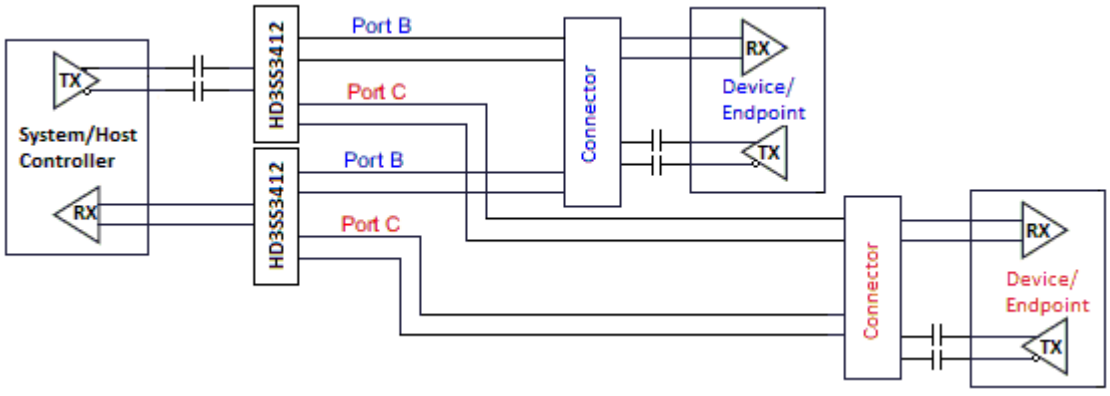

Figure 3 AC Coupling Capacitors on Host TX and Endpoint TX

In the case where the common mode voltage in the system is higher than 2V, the coupling capacitors are placed on both sides of the switch (shown in Figure 4). A biasing voltage of less than 2V is required in this case.

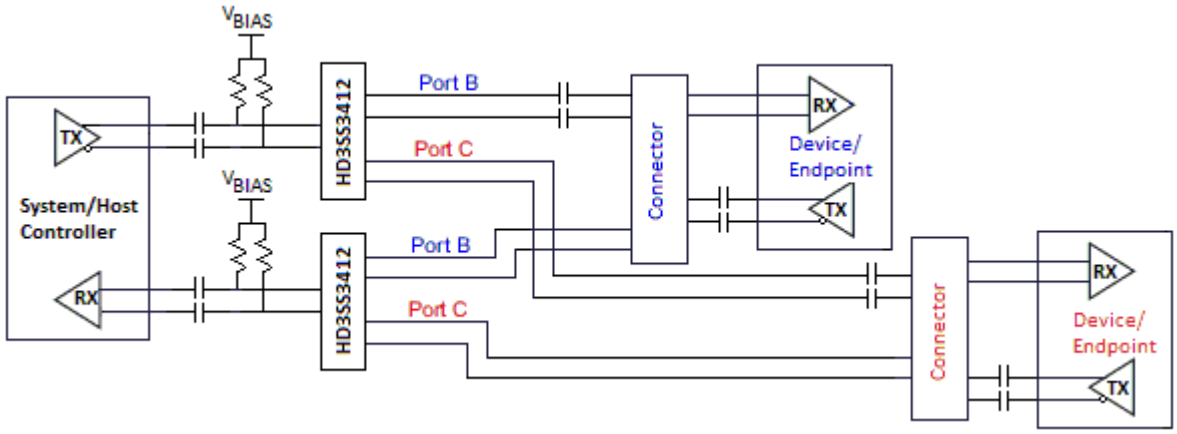

Figure 4 AC Coupling Capacitors on Both Sides of Switch