

DisplayPort AUX Channel Application

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Introduction

Pericom's PI3VDP612 is a high bandwidth 1:2 Demux switch to support two DisplayPort (DP) paths. Pericom's PI3PCIE2612-A/B offer similar switching performance for PCIe on one path and DisplayPort on the second path. As AUX channel on PI3VDP612 or PI3PCIE2612-A/B permits 2V or less input voltage to pass through, proper IC placement on customer's board has to be aware. Source Application placements of PI3VDP612 and PI3PCIE2612-A/B are recommended in this application note and block diagrams in Source Applications are studied.

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AUX Channel Overview

Per DisplayPort Standard, to assist detection of DP Source, it is required that DP Source device weakly pulls AUX+ line to ground and weakly pulls AUX- line up to 3.3V with 100kΩ (±5%) resistors between AC coupling capacitors and source connector in Source Application.

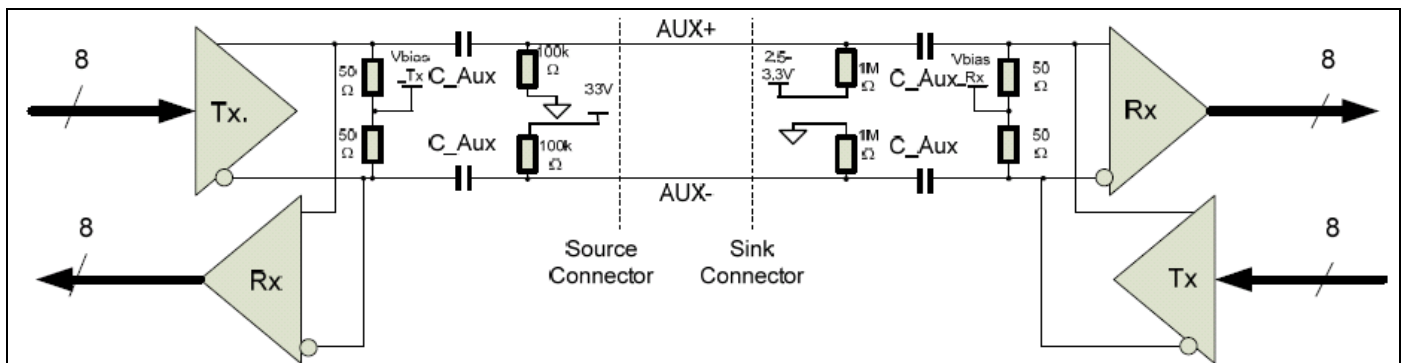


Figure 1: AUX Channel Differential Pair

Since 100kΩ pull-up to 3.3V initiates high DC voltage that exceeds the 2.0V AUX voltage limit of PI3VDP612, PI3VDP612 cannot be connected to the AUX- channel pull-up directly. When PI3VDP612 is sitting in the Source side, it has to be located between 50Ω termination resistors and AC coupling capacitors, namely C_Aux. AUX signals coming from Sink connector will be AC coupled by C_Aux before entering PI3VDP612. As Vbias_Tx is 2.0V maximally per DisplayPort Standard, 50Ω pull-ups to Vbias_Tx will not affect the AUX channel performance of PI3VDP612.

When the DP path of PI3PCIE2612-A/B is connected to AUX channel transmission, DC voltage of AUX channel has to be ensured not being over 2V as well.

Proper Placement of PI3VDP612 or PI3PCIE2612-A/B for AUX Signal Transfer

AC coupling capacitors, C_Aux, can AC couple the AUX signals transmit through PI3VDP612 or PI3PCIE2612-A/B. By placing the DP switch between 50Ω termination resistors and AC coupling capacitors, AUX channel signals can be delivered correctly.

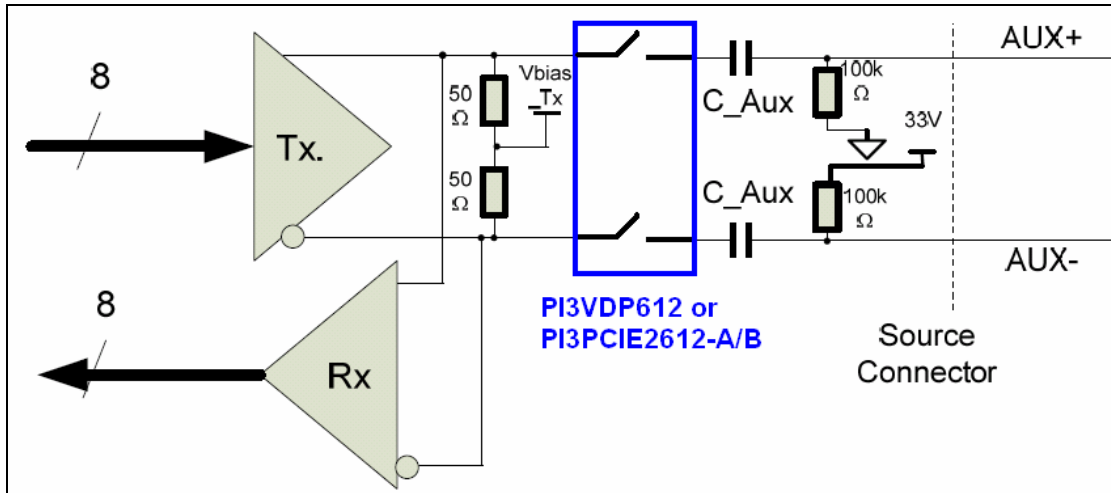


Figure 2: Proper Placement in Source Application

Improper Placement of PI3VDP612 or PI3PCIE2612-A/B for AUX Signal Transfer

If PI3VDP612 or PI3PCIE2612-A/B is placed after AC coupling capacitors, C_Aux and before DP Source connector, input AUX- channel signal will be DC offset by the weak 100kΩ pull-up to 3.3V. The signal, thus, cannot be delivered to/from DP Source connector properly.

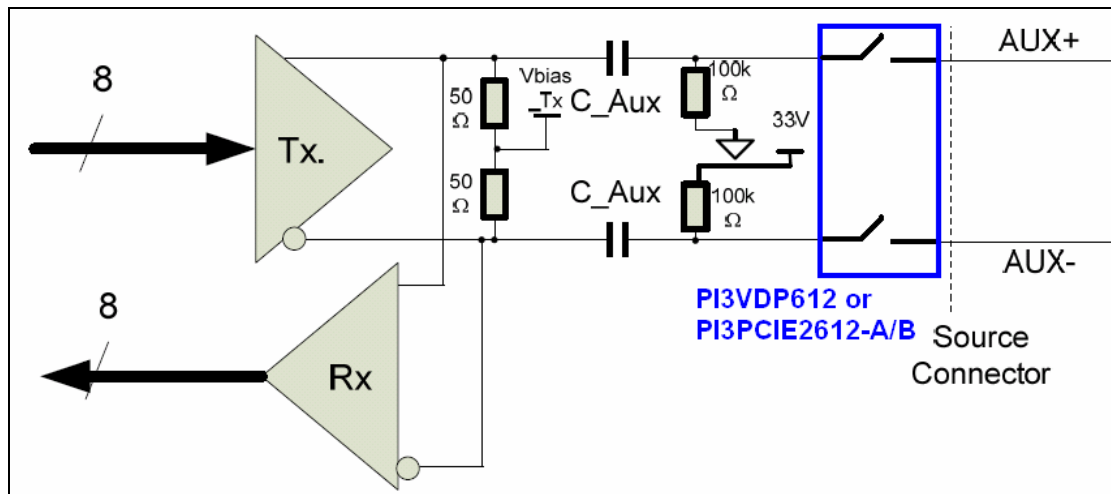


Figure 3: Improper Placement in Source Application

Block Diagrams of PI3VDP612 in Source Application

Below is a case study of employing PI3VDP612 as 1:2 DEMUX in DP Source Application. In some Source Applications, DP signals from North Bridge are displayed on HDTV or DVI monitor. Dual Mode DP signals coming out from North Bridge through PI3VDP612 are transferred to two PI3VDP411LS, where one is located on main board and the other one is implemented in docking station in this example. PI3VDP411LS, which offers digital video level shift, works with HDMI/DVI application.

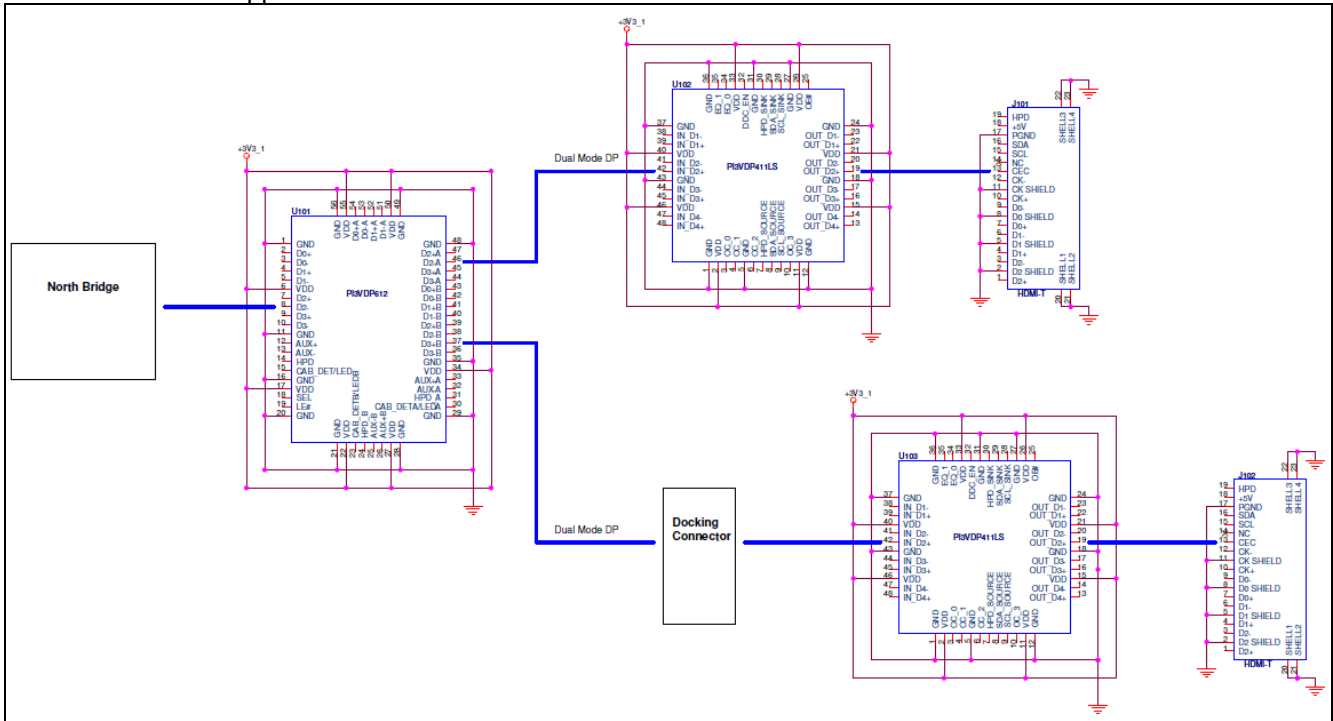


Figure 4: Block Diagram of DEMUX PI3VDP612 in Source Application

Here is another case study of employing PI3VDP612 in 2:1 MUX Source Application. Signals from North Bridge and Graphic Module on motherboard will be multiplexed in PI3VDP612. Dual Mode DP signals will then be sent to HDTV or DVI monitor through PI3VDP411LS and HDMI/DVI connector.

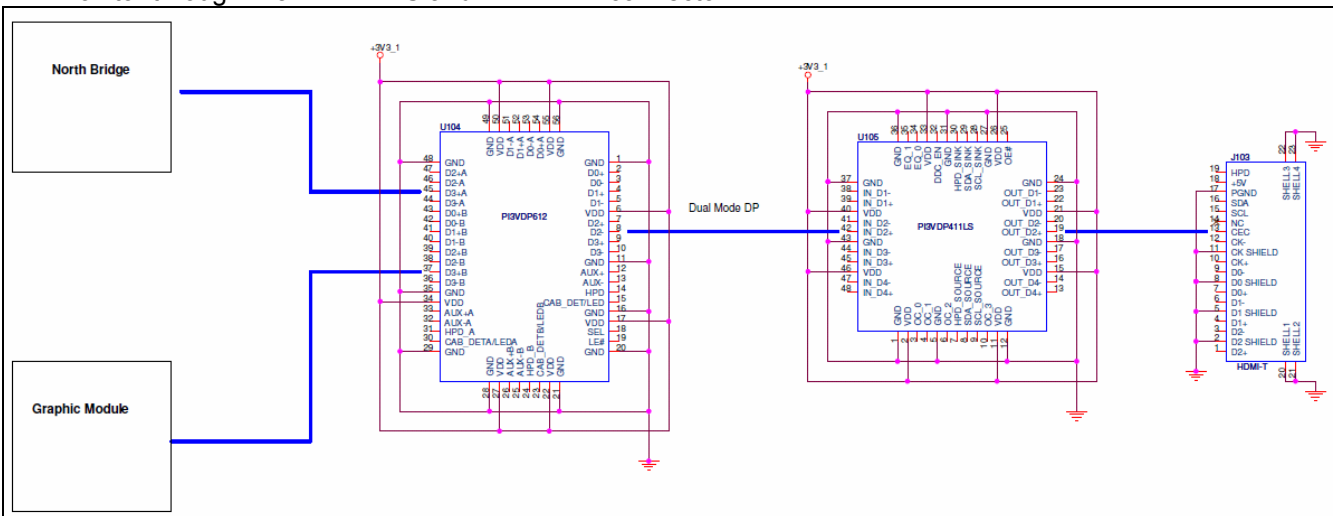


Figure 5: Block Diagram of MUX PI3VDP612 in Source Application

Block Diagram of PI3PCIE2612-A in Source Application

As shown in the following case study, PI3PCIE2612-A can be employed to 1:2 DEMUX for PCIe and Dual Mode DP. PI3VDP2612-B offers the same application. PCIe and DP signals can be selected from North Bridge on motherboard. PCIe signals outputting from PI3PCIE12612-A can be connected to PCIe Slot on motherboard for PCIe card. Dual Mode DP signals can be level shifted by PI3VDP411LS and then sent to HDMI or DVI connector on motherboard.

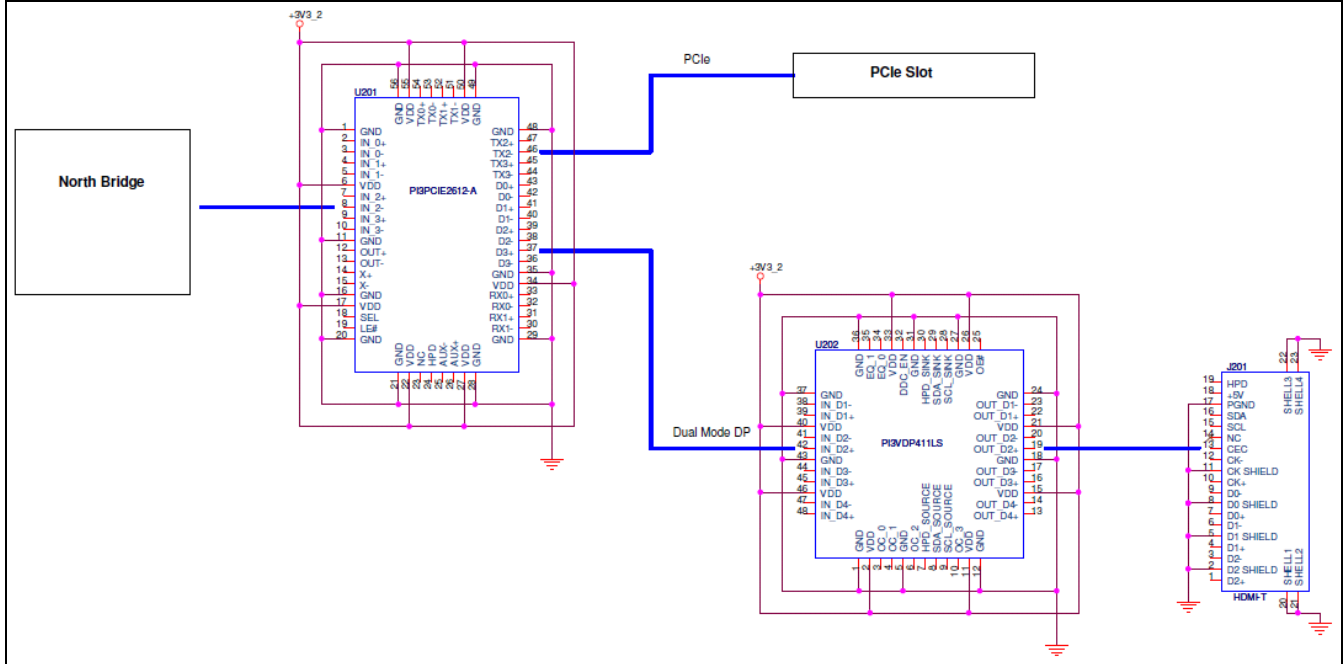


Figure 6: Block Diagram of DEMUX PI3PCIE2612-A in Source Application