

# USB PHY (including SMSC USB3318) - VBUS Design Advisory

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## 1 Introduction

The XR-USB-AUDIO-2.0 and XR-USB-AUDIO-2.0-MC reference designs are based on xCORE General Purpose devices (L-Series) and use an SMSC USB3318 USB Transceiver.

This part has a VBUS monitor pin which is connected to the VBUS pin of the USB connector via a resistor. This resistor is used to protect the SMSC part against over-voltage transients.

XMOS has identified a problem when the voltage at the VBUS pin of the USB3318 is near the internal threshold for VbusValid (4.4V min, 4.58V typical, 4.75V max). When this condition occurs, packets are sent continuously on the ULPI bus which affects system operation (causing possible audio glitches etc.)

## 2 Solution

The XMOS reference designs based on xCORE General Purpose devices use a resistor value of 1k $\Omega$  for this VBUS resistor. By increasing the value of this resistor to 20k $\Omega$ , the internal pulldown on the VBUS pin within the USB3318 (40-100k $\Omega$ ) ensures the voltage on the VBUS pin can never be near the internal VbusValid threshold for all valid USB VBUS voltages.

This note advises that when a SMSC USB3318 transceiver is used, the resistor on VBUS should be changed from 1k $\Omega$  to 20k $\Omega$  in all USB device applications.

This note also advises that XMOS has not been able to reproduce the above behavior on later PHYs such as USB334x series, and therefore recommends the use of these PHYs where possible.