AN 19.0

Migrating USB Designs from the USB3320 to the USB3340/USB83340

1 Introduction

For customers who want to integrate the USB3320 and are looking to the USB3340/USB83340 for future products, this document describes the hardware and software considerations required to accomplish that migration with the least impact to customer design resources. By following the design guidelines outlined in this document, a designer can use a common PCB and software platform that can be used for both the USB3320 and USB3340/USB83340 with nothing more than a change to the Bill of Materials (BOM) being required.

2 References

SMSC USB Transceiver Datasheets:

- USB3320
- USB334x
- USB83340

3 Designing a Common PCB for the USB3320 and USB3340/USB83340

A common PCB design can be engineered to support both the USB3320 and USB3340/USB83340 transceivers. Observing a few simple design considerations will provide a seamless transition from USB3320 to USB3340/USB83340. Unless otherwise specified within this document, all PCB layout design guidelines that apply to the USB3320 shall apply to the USB3340/USB83340.

To design a common hardware platform for both USB transceivers, there are three design changes that must be made:

- Depopulate or disable the 1.8V regulator input.
- Change the capacitor on the VDD18 pin from a *0.1 μF* to a *1.0 μF* low-ESR capacitor.
- VBAT min voltage raised from 3.1V to 4.0V for the USB83340 only. (USB3340 VBAT min voltage lowered to 3.0V)

Other optional changes that can be made:

- Change the capacitor on the VDD33 pin from a *2.2 μF* low-ESR to a *1.0 μF* low-ESR Capacitor.
- Change the resister on the RVBUS pin from a 10kΩ to 20kΩ resistor.

3.1 Integrating the 1.8V Regulator

The USB3340/USB83340 integrates the 1.8V regulator that was external to the USB3320. The VDD18 pin of the USB3320 is an input and requires an external voltage source to be applied to the pin. Conversely, the VDD18 pin of the USB3340/USB83340 is an output that must never be presented with an externally sourced voltage.

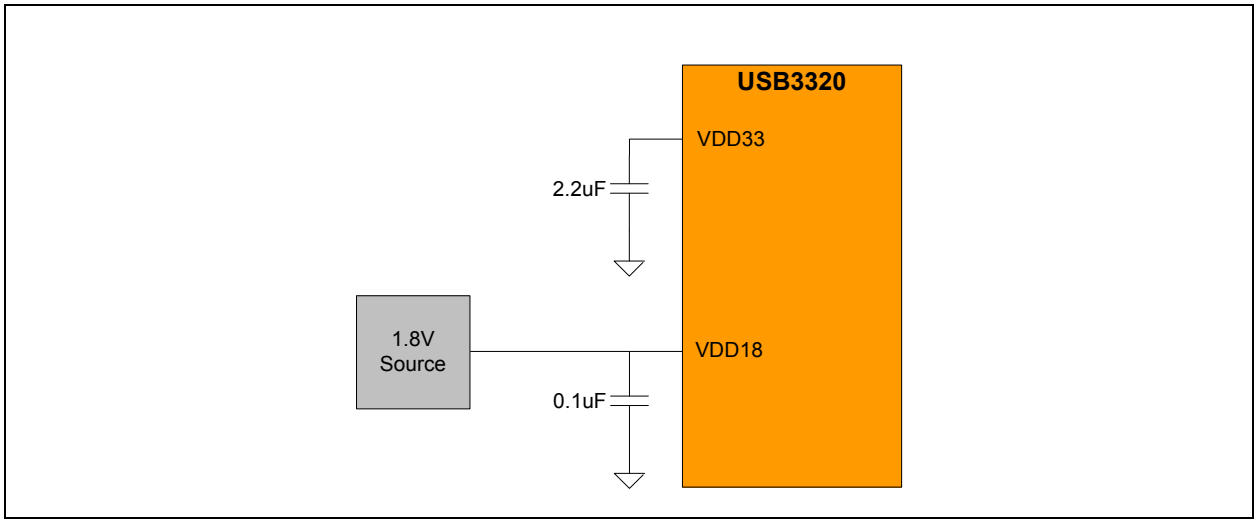

Figure 3.1 - USB3320 Application

If the 1.8V regulator in the USB3320 application is dedicated to the USB3320, as shown in Figure 3.1, then it can simply be removed from the design by removing all of its associated components. An alternative to this is using hardware or software to merely disable the external regulator, but this approach is discouraged because this external regulator will likely carry some additional capacitance as well as a possible current path for the internal 1.8V regulator output of the USB3340/USB83340.

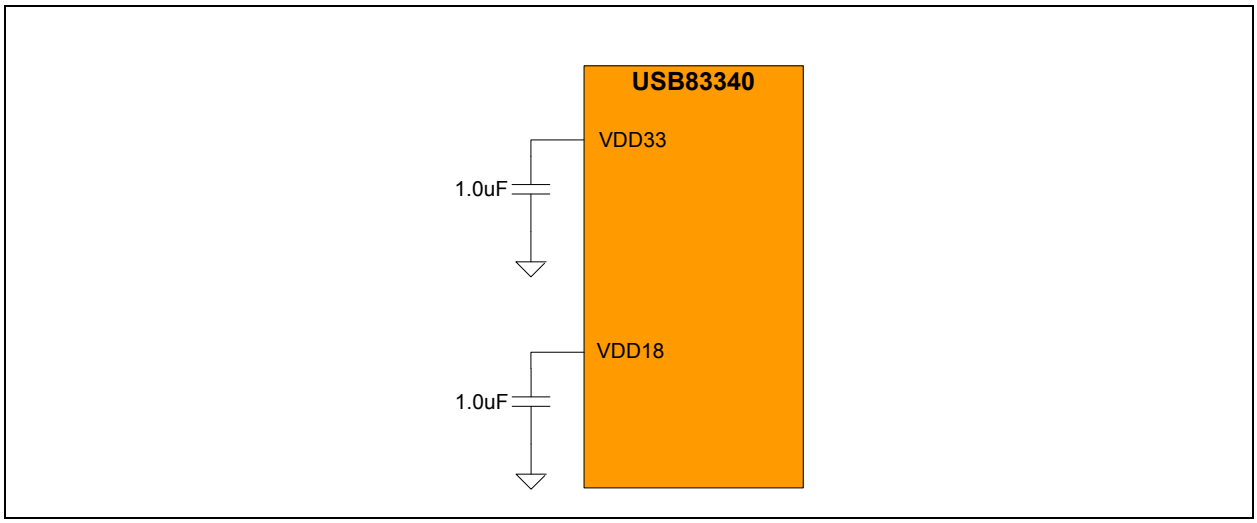

Figure 3.2 - USB3340/USB83340 Application

If the 1.8V regulator in the USB3320 application is shared between the USB3320 and other system elements, installing a zero ohm precision resistor between the 1.8V source and the USB3320 will allow

for this external source to be disconnected from the USB3340/USB83340 by removing it from the BOM at the time that the USB3340/USB83340 is installed. Figure 3.3 shows the two application circuits with arrows highlighting the removal of the zero ohm resistor when migrating the application to the USB3340/USB83340.

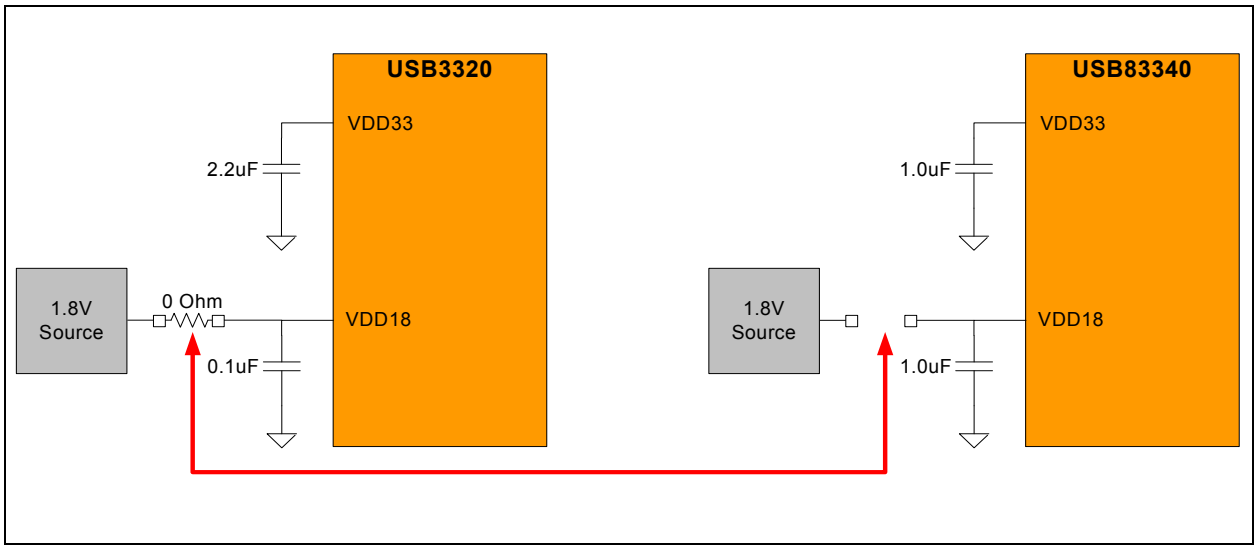

Figure 3.3 - Removing Zero Ohm Resistor to Disconnect 1.8V Source

3.2 VDD18 Capacitor

It is recommended in applications using the USB3320 that a 0.1 µF decoupling capacitor be placed near the VDD18 pin of the USB3320, as shown in Figure 3.1. However, for the USB3340/USB83340, this capacitor is required for regulator stability and must be 1.0 µF (<1Ω ESR), as shown in Figure 3.2.

3.3 VDD33 Capacitor

It is required in applications using the USB3320 that a 2.2 µF (<1Ω ESR) capacitor be placed near the VDD33 pin of the USB3320 for regulator stability, as shown in Figure 3.1. For USB3340/USB83340 applications, the value of this capacitor *may* be reduced to be 1.0 µF (<1Ω ESR), as shown in Figure 3.2.

3.4 RVBUS Resistor

It is required in applications using the USB3320 that a 10 kΩ external resistor be placed in series with the RVBUS pin. For the USB3340/USB83340 it is recommended to change that resistor to a 20 kΩ external resistor. Please refer to SMSC's white paper titled "Optimal VBUS detection in USB Devices" for more extensive details on this topic.

3.5 VBAT Voltage

For the USB83340, it is required to change the minimum operating VBAT voltage to 4.0V. The USB3340 will operate with a VBAT voltage down to 3.0V.

4 Software

Migrating applications from the USB3320 to the USB3340/USB83340 ***does not require any software change***.

All features supported on the USB3320 will function on the USB3340/USB83340 without any modification required to the software. However, there are three features which are available to USB3340/USB83340 applications if the software is written to take advantage of them.

- Link Power Management
- High Speed Receiver Compensation
- Charging Host Detection

5 Summary

Migrating an application using the USB3320 to the USB3340/USB83340 can be accomplished without any impact to software and using a common PCB with only some minor modifications to the BOM. Software modifications are only required if the customer wishes to take advantage of the new features offered by the USB88340.

Table 5.1 Hardware Migration and Feature Summary

USB TRANSCEIVER	EXTERNAL 1.8V REGULATOR	VDD18 CAPACITOR	VDD33 CAPACITOR	LINK POWER MANAGEMENT	HIGH SPEED USB RECEIVER COMPENSATION	CHARGING HOST DETECTION	RVBUS RESISTOR
USB3320	Required	0.1 µF	2.2 µF (<1Ω ESR)	No	No	No	10kΩ
USB3340/USB83340	Remove or disconnect from application	1.0 µF (<1Ω ESR)	1.0 µF or 2.2 µF (<1Ω ESR)	Yes	Yes	Yes	20kΩ

6 Further Information

For more information on SMSC automotive products, including integrated circuits, software, and MOST development tools and modules, visit our web site: http://www.smsc-ais.com. Direct contact information is available at: http://www.smsc-ais.com/offices.

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7 Application Note Revision History

Table 7.1 Customer Revision History

REVISION LEVEL & DATE	SECTION/FIGURE/ENTRY	CORRECTION
Rev. 1.2 (11-26-12)	Document co-branded: Microchip logo added, modification to legal disclaimer	
Rev. 1.2 (07-20-10)	All	Added USB3340 part number to app note. Added min VBAT voltage change requirement for USB83340 in Chapter 3.
Rev. 1.1 (08-17-09)	Chapter 3	RVBUS external register changed from 10 kΩ to 20 kΩ
Rev. 1.0 (12-16-08)	Initial Release	