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USB553xB Migration Guide

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INTRODUCTION

This application note details migration to the USB553xB family of devices from previous device revisions. The following migrations are detailed:

- USB553xB-5000
  - from USB553xB-4100
  - from USB5434/USB5434B
- USB553xB-6080
  - from USB553xB-5000

THE USB553XB-5000

The USB553xB-5000 is the first fully USB-IF certified SuperSpeed Hub in the SMSC/Microchip family of SuperSpeed Hubs. This version of the part complies with the USB-IF SuperSpeed Hub certification without any waivers. This document contains all of the changes that have been made to the USB553xB-5000 that a system designer needs to be aware of when transitioning from older revisions. The USB553xB-5000 family contains the USB5532B-5000, USB5533B-5000, USB5534B-5000, and USB5537B-5000.

Migrating from the USB553xB-4100

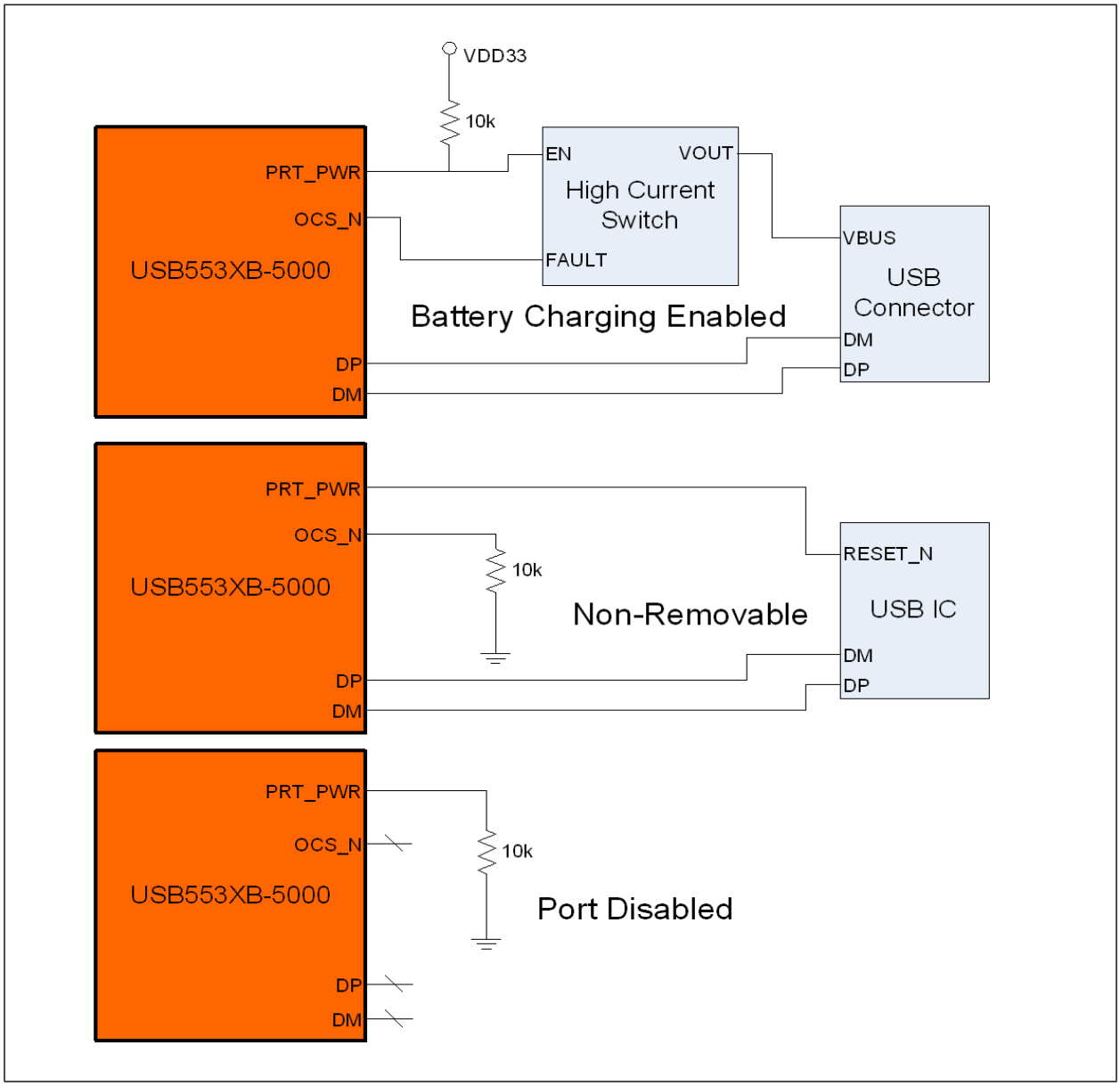
Although the USB553xB-4100 is pin-for-pin compatible with the USB553xB-5000, some of the pins have had strap options added to them to enable special features.

The PRT_PWR pins and the OCS pins are now sampled at POR/Reset to determine the port functionality. If the PRT_PWR[N] pin is pulled down, the entire port will be disabled to conserve power. If the pin is pulled high the port will act as a battery charging enabled port. If the PRT_PWR pin is left floating it will operate as a standard downstream port.

The OCS[N] pins are also sampled at POR/Reset. If the pins are pulled down at startup, the USB553xB-5000 will report the port as non-removable.

The pulling resistor should be between 1k and 10k to ensure the pin is sampled correctly and will function properly during normal operation.

FIGURE 1: USB553XB-5000 STRAP EXAMPLES



In the USB5537B, there no OCS pins for ports 5, 6, and 7, so their non-removable state cannot be configured via strapping. The default behavior of these ports is different for the USB5537-5000 versus the USB5537-4100. In the USB5537B-5000, these ports will be configured as non-removable by default. In the USB5537B-4100, they are not configured as non-removable. To change how these ports are configured, use the ProTouch support software.

SCHEMATIC CHECK

When migrating from the USB553xB-4100 the following items must be checked:

1. PRT_PWR/PRT_CTL[N] pins

   Check if any pull-up or pull-down resistors exist on the schematic.

   Confirm strap functionality in the data sheet and compare to desired functionality.

   If the pin is pulled-up, battery charging is enabled. If the pin is pulled-down, the port is disabled. Ensure that the resistance is between 1k and 10k.

2. OCS[N] pins -

   Check if any pull-up or pull-down resistors exist on the schematic.

   Confirm strap functionality in the data sheet and compare to desired functionality.

   If the pin is pulled-down the port is non-removable. Ensure that the resistance is between 1k and 10k.

Migrating from the USB5434 or USB5434B

The USB5534B-5000 contains additional logic to conform to additional USB-IF requirements that were added since the USB5434 and USB5434B were released. The USB5534B-5000 also contains additional programmability options to provide greater flexibility to the end user.

The USB5434B does not have the same exact pinout as the USB5534B-5000. The additional pins enable access to an external SPI flash and allow an SOC to control the hub through SMBus. To ensure that the system designed for the USB5434B will not cause any problems with the added features, a system designer must confirm that the pins are connected properly. The following table shows the recommended connections for the SPI and SMBus pins. The table also shows what connections are allowed and what connections would cause a problem with the functionality of the part.

TABLE 1: USB5434B TO 5534B-5000 PIN CONNECTIONS

Additional Pin	GND	10k PD	Float	10k PU	VDD33
37/SM_DAT	Allowed	Allowed	PROHIBITED	Recommended	Allowed
38/SM_CLK	Allowed	Recommended	PROHIBITED	PROHIBITED	PROHIBITED
39/SPI_CE_N	PROHIBITED	Allowed	Allowed	Recommended	Allowed
40/SPI_CLK	PROHIBITED	Allowed	PROHIBITED	Recommended	Allowed
41/SPI_DO	PROHIBITED	Recommended	Allowed	Allowed	PROHIBITED
42/SPI_DI	Allowed	Recommended	PROHIBITED	Allowed	Allowed

SCHEMATIC CHECK

When migrating from the USB5434B to the USB5534B-5000, the following items must be checked:

1. PRT_PWR/PRT_CTL pins

   Check if any pull-up or pull-down resistors exist on the schematic.

   Confirm strap functionality in the data sheet and compare to desired ability.

   If the pin is pulled-up, battery charging is enabled. If the pin is pulled-down, the port is disabled. Ensure that the resistance is between 1k and 10k.

2. OCS[N] pins

   Check if any pull-up or pull-down resistors exist on the schematic.

   Confirm strap functionality in the data sheet and compare to desired ability.

   If the pin is pulled-down, the port is non-removable. Ensure that the resistance is between 1k and 10k.

3. SPI pins

   Check if any PROHIBITED connections are made.

4. SMBus pins

   Check if any PROHIBITED connections are made.

   One of the SMBus pins must be pulled to GND to ensure the part will enter the proper execution state.

THE USB553xB-6080

The USB553xB-6080 is the fourth generation USB 3.0 SuperSpeed Hub in the SMSC/Microchip family of SuperSpeed Hubs. Some new features are:

- Reduced Suspend power to less than 15mW
- Combined mode operation of the PRTCTL signal is now supported when BC is enabled on the respective port
- Offers Dynamic Battery Charging feature enabled by default
  - The Dynamic Battery Charging support will utilize an external pin on the USB553xB that will enable Battery Charging support globally when high and disable Battery Charging support globally when low
  - The ports may not immediately leave or enter a BC state if the dynamic BC signal is toggled to preserve normal USB functionality

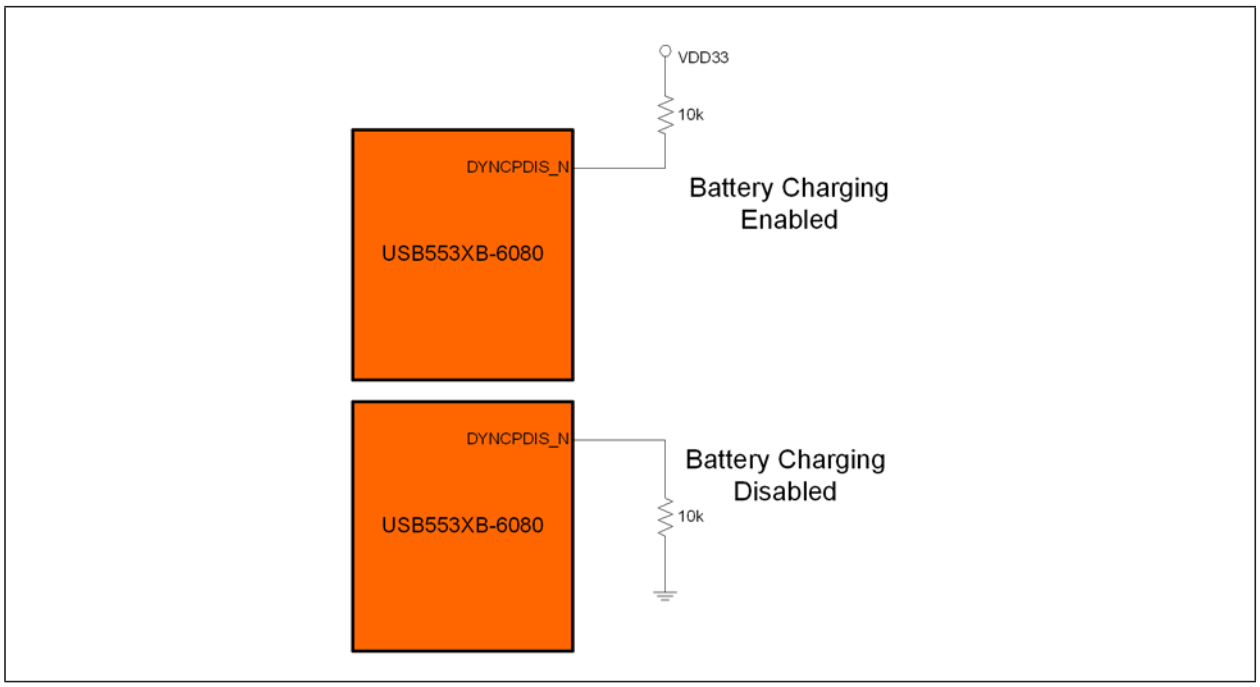
This document contains all of the changes that have been made to the USB553xB-6080 that a system designer needs to be aware of when transitioning from older revisions. The USB553xB-6080 family contains the USB5532B-6080, the USB5533B-6080, the USB5534B-6080 and the USB5537B-6080.

Migrating from the USB553xB-5000

Although the USB553xB-5000 is pin-for-pin compatible with the USB553XB-6080, pin TRST/DYNCPDIS_N/UCS_SMBALERT_N (Pin #45 of 64-QFN, Pin #49 of 72-QFN) is used for controlling Dynamic Battery Charging (BC). This active-low signal is used to globally disable Battery Charging support on all USB downstream ports configured as Charging Ports.

Dynamic Charging Port support utilizes the device's DYNCPDIS_N pin to disable Battery Charging support globally when low and, when high, allow any ports configured as Charging Ports (either through a configuration file or straps) to resume their Battery Charging operation in the configured charging mode.

FIGURE 2: DYNAMIC BATTERY CHARGE EXAMPLES



APPENDIX A: REVISION HISTORY

TABLE A-1: APPLICATION NOTE REVISION HISTORY

REVISION LEVEL & DATE	SECTION/FIGURE/ENTRY	CORRECTION
DS00001723A (04-14-14)	REV A replaces previous SMSC version Rev. 1.1 (03-24-14)	
Rev. 1.1 (03-24-14)	Section 2	Added new section for USB553XB-6080 migration
Rev. 1.0 (05-06-13)	All	Initial release

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