AN-9074

Using FSA800 and FSA805 in Applications with Two High-Speed USB Ports

Introduction

This document is intended to aid systems designer when designing in the Fairchild Semiconductor FSA800 or FSA805 USB multimedia switch for applications with multiple high-speed (HS) USB interfaces.

The FSA800 and FSA805 are optimized for designs incorporating three types of interfaces: high-performance audio for headphones; UART for programming and debug; and HS USB for charging and data transfer. As a result, each path on the FSA800/805 has different series resistance (R_{ON}) and on capacitance (C_{ON}). Due to the design of the devices, the UART path is also capable of interface to HS USB ports and meeting eye compliance.

The following sections discuss the applications and performance data in HS USB operation for the UART path.

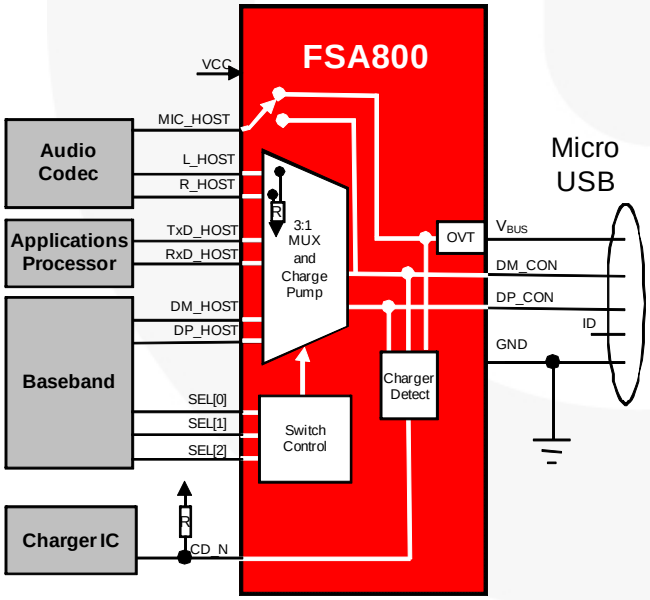

Figure 1. FSA800 Typical Application: Two HS USB Ports with High-Performance Audio

HS USB Applications

Figure 1 shows an application of the FSA800 with two HS USB ports and one audio port for headphone audio. In this case, the USB (DP_HOST, DM_HOST) and UART (RxD_HOST, TxD_HOST) are used to route the USB traffic in the mobile device. The architecture for the audio path is designed to allow audio signals to swing below ground, so a common USB and headphone jack can be used for personal media players and portable peripheral devices.

The FSA800 also detects dedicated wall chargers with an active LOW indicator pin.

The FSA800 meets USB specification rev. 2.0 and the micro USB specification.

Selecting the FSA800 or FSA805

The FSA800 and FSA805 are both 3:1 USB accessory switches that enable USB data, stereo/mono audio, and UART data to share a common connector port. They are designed for high-speed USB 2.0 signaling with an architecture that allows audio signals to swing below ground (up to -0.8V), so a common USB and headphone jack can serve personal media players and portable peripheral devices.

The FSA800 differs from the FSA805 in that the FSA800 has functionality to detect USB dedicated chargers and can switch a headset microphone for stereo and mono audio applications. The FSA805 is available in a 1.8mm x 1.8mm 12-lead ultrathin molded leadless package (UMLP) and has a lower power specification. The FSA800 is available in a 1.8mm x 2.6mm 16-lead UMLP.

High-Speed USB Eye Compliance Results for All Signal Paths

The following figures show HS USB 2.0 eye diagrams for the USB and UART path of the FSA800 and FSA805. Full compliance reports are available upon request. Figure 2 shows the eye diagram of the HS USB source used for testing of the FSA800 and FSA805 paths.

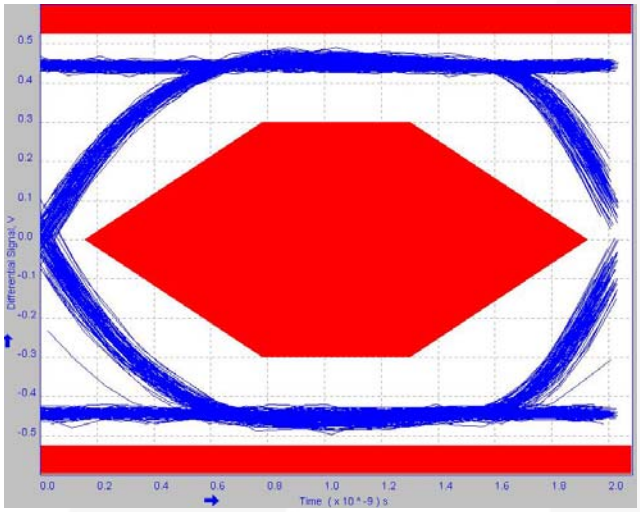

Figure 2. High-Speed Eye Diagram for Source for All Testing

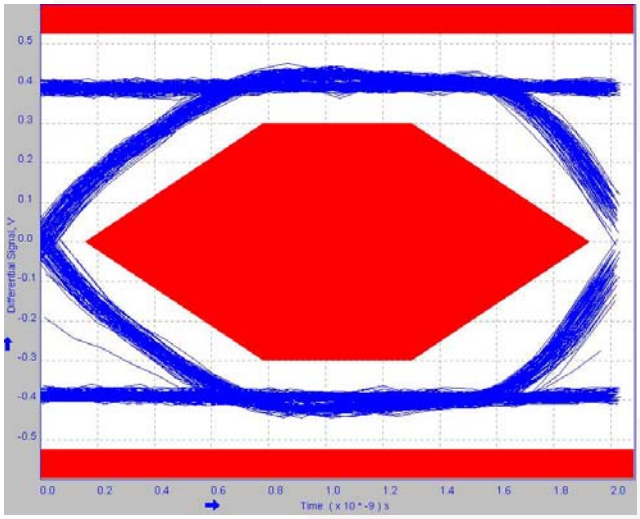

Figure 3. FSA800 USB Path High-Speed Eye Diagram

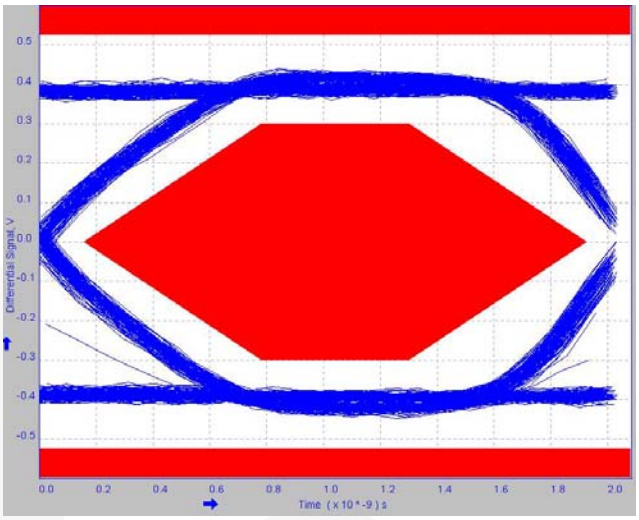

Figure 4. FSA800 UART Path High-Speed Eye Diagram

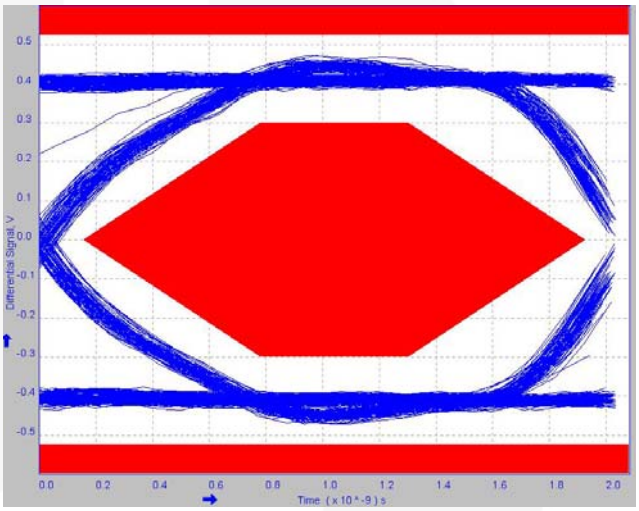

Figure 5. FSA805 USB Path High-Speed Eye Diagram

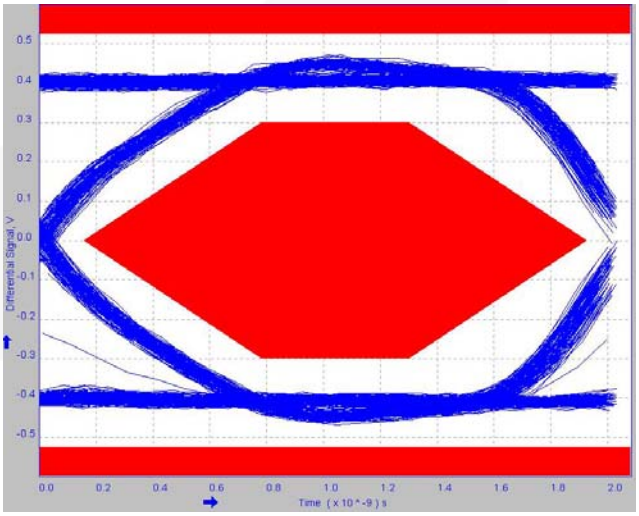

Figure 6. FSA805 UART High-Speed Eye Diagram

Applications Considerations

Implementing Charger Detection

The FSA800 implements the resistive detection method in the USB Battery Charging Specification, Rev 1.0. If charger detection is used, a pull-up resistor (122kΩ to 128kΩ) to V_{CC} must be placed on DP_CON and a pull-down resistor (367kΩ to 383kΩ) to ground must be placed on DM_CON. This allows the FSA800 to detect D+ and D- as HIGH when a USB dedicated charger is attached.

Switching between USB Controllers

When using the FSA800 to switch between USB controllers, it is recommended to switch to open between the two USB connections. This allows the host to recognize a disconnect for a full frame between states, so the host then re-enumerates with the newly connected controller. For switching between full-speed controllers, a delay with the FSA800 switch open of 2.5µs is recommended. For switching between high-speed controllers, a delay 125µs is recommended, considering microframe intervals.

Power-Up Default for Switch State

The SEL pins are CMOS inputs and should not be left in a floating condition. Some applications require a specific path be in the closed position on power-up for initial programming of the device under test. If that condition is desired, the three SEL pins should be pulled to the correct levels with external resistors that exceed 100KΩ to reduce the static power consumption. In other applications, adding weak pull-down resistors to GND defaults the device to all paths open (low-power mode).